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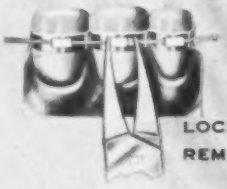

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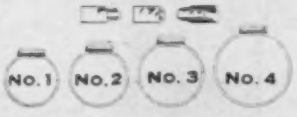

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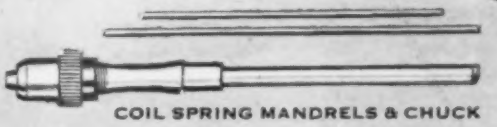

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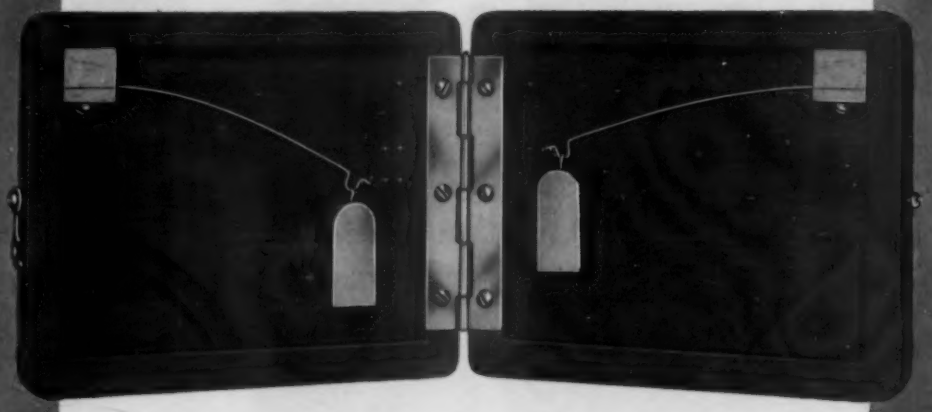

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VOL. 34 JUNE, 1948 NO. 6

Original Articles

TREATMENT OF CLASS II, DIVISION 1 (ANGLE)

II. DIFFERENTIAL DIAGNOSIS AND AN ANALYSIS OF MANDIBULAR ANCHORAGE

BERCU FISCHER, D.D.S., NEW YORK CITY

INTRODUCTION

THIS is the second paper* of a series dealing with the treatment of Class II, Division 1. The present paper is divided into two parts. The first part is a discussion of the differential diagnosis between the various types of Class II, Division 1 and the limitations to be expected in their treatment. The second part is an analysis of mandibular anchorage and an evaluation of its behavior when intermaxillary force is used for the correction of the anteroposterior malrelationship of the dental arches in the treatment of Class II, Division 1.

The recent development of more accurate methods of recording dentofacial changes has made possible the study of angles and angular relationships between the various component parts of the dentofacial complex. Some of these hold out the promise of being dependable criteria which, together with some facial, dentofacial, and dental traits, could be used as a basis for a differential diagnosis and classification based upon treatment.

While additional observations and studies will be required before such an all-inclusive clinical classification can be established, a start in this direction is attempted in this paper in the hope that it will engage the interest of others. Although this differential classification is supported by a number of treated and completed cases, it cannot be considered more than a preliminary report.

That such a classification based upon treatment will in turn demand a fundamental change in the present management of our orthodontic patients is one of the important points that I hope will become evident from the material to be presented.

To me, the available evidence so far has brought out clearly the shortcomings of my own clinical judgment which was based upon the hypotheses of Angle and of those who followed him.

Presented at the meeting of the Northeastern Society of Orthodontists, Nov. 10, 1947, New York, N. Y.

*The first paper of this series entitled, "Treatment of Class II, Division 1 (Angle). I. Occipital Anchorage," was published in the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY 33: 705-737, November, 1947.

In the light of advancing orthodontic knowledge, I have gradually become aware that the inadequacy of some of these hypotheses was in some measure responsible for some of my failures.

In what follows, I shall endeavor:

1. To review the new basic knowledge that contradicts some of the hypotheses upon which our clinical judgment in the management of Class II, Division 1 depends.
2. To describe the various types of Class II, Division 1.
3. To discuss the limitations of treatment of these various types.
4. To evaluate mandibular anchorage in the light of these findings.

DIFFERENTIAL DIAGNOSIS

Angle's Hypotheses.—There are two hypotheses upon which Angle based his definition and treatment of Class II, Division 1: (1) the constancy of eruption of the maxillary first permanent molar; (2) the stimulation caused by correct tooth relationship "would develop the face and jaws to their ultimate perfection of balance and harmony."[2] The fact that the force generally used today for the correction of the Class II arch relationship is still the one used by Angle (intermaxillary force derived from elastics) indicates that these hypotheses are still considered valid.

Since this paper deals with a critical analysis of mandibular anchorage as it is used today in the treatment of Class II, Division 1, it is entirely fitting that we discuss these hypotheses and evaluate them in the light of the newer knowledge.

Is it true that the maxillary first permanent molar always erupts in its correct position in relation to the face and cranium?

Angle assumed this to be true and defined Class II, Division 1 as a malocclusion in which the mandibular dental arch is always distal. His definition allowed no variation in this fixed position of the maxillary dental arch. He stated this very clearly in the seventh edition of his book:

> It is a common mistake to suppose that this form of malocclusion is the result of overdevelopment of the upper jaw. The author (Angle) has never seen a case where this condition existed, neither are the teeth of the upper jaw "inherited too far forward," . . .[1]

The clinical implication of this definition is that all Class II, Division 1 cases are alike and since the maxillary arch is fixed, they must all be treated by a forward movement of the mandibular dental arch. The mechanics he used were a logical development of this reasoning.

As opposed to this, there is the hypothesis that Class II, Division 1 cases are not alike.

CLASS II, DIVISION 1 CASES—NOT ALIKE

It is an acknowledged fact today that there are great variations in the attributes that characterize even the typical Class II, Division 1 cases of malocclusion. The variations in the final results of similar orthodontic treatment indicate that there must be some fundamental differences. With the exception

of the Class II molar relationship which is absolute, the remaining attributes such as the protrusion of the incisors, arch form, the position and inclination of the mandible as related to the face and cranium, dentofacial relationship, etc., are relative and show considerable variation.[22]

Today we still lack the criteria that would enable us to measure the forward or backward displacement of the dental arches. Many attempts at securing devices for this purpose have been made.[3, 24, 30] It is doubtful, however, whether any of these are sufficiently reliable to warrant much confidence in their use for individual cases. Because of the complex nature of the phenomenon involved and the absence of a standard, the conclusion that these differences exist can be made mainly by inference from evidence obtained from a cephalometric appraisal of treated cases and from anthropometric investigations.

In the first paper of this series dealing with occipital anchorage in the treatment of Class II, Division 1,[14] I showed that the changes in the dentofacial complex which bring about a correction of the arch relationship vary. Although the occipital force had been applied directly to the maxillary dental arch and no intermaxillary elastics were used, the corrected arch relationship was not always the result of a posterior movement of the maxillary dental arch. The corrected arch relationship was the result of various changes. In some cases the posterior movement of the maxillary dental arch produced a compensatory adjustment of the surrounding parts to the postural inclination of the mandible. In other cases there was little posterior movement of the maxillary arch, the corrected occlusion being the result of a repositioning of the entire mandible to the changed occlusal plane of the maxillary dental arch. Again, the corrected occlusion was due to a combined posterior movement of the maxillary dental arch and a repositioning of the mandible. There were also rotations of the entire mandible.

These changes in the dentofacial complex which result in a corrected occlusion furnish clinical evidence that Class II, Division 1 cases are not alike. Upon the basis of one relationship, that of the dental arches to the face and cranium, we recognize at least five important different conditions: (1) protrusions of the maxillary dental arch; (2) retrusions of the mandibular dental arch; (3) functional mandibular retrusions; (4) structural mandibular retrusions; (5) bimaxillary protrusions.

It must be understood that the conditions mentioned do not always exist in nature as clearly definable extremes. On the contrary, they are more likely to be found in a variety of combinations that may occur in the relationship of the dental arches to the face and cranium. This is true of all interrelationships of biologic structures. For instance, if the gradations in the anteroposterior interrelationship of the dental arches in Class II, Division 1 are arranged in series, they will be found to occur in combinations ranging from an extreme protrusion of the maxillary dental arch to an extreme retrusion of the mandibular dental arch with all the intervening stages. An analysis will reveal that they extend through a more or less continuous range. There are no sharp lines of division, and the grouping of such interrelationships can only be made by drawing arbitrary lines of division. Examination of the reasoning

process in making such divisions indicates that the extreme cases can be recognized quickly and grouped into categories with precision. In the middle range, however, there is a great deal of overlapping. Differences of opinion are, therefore, to be expected in the middle range. It would be well to remember this point since cases of the middle range are often selected as bones of contention in order to negate judgments that are otherwise perfectly valid for the extremes. For this reason, it is necessary to use sharply defined extremes if we are to avoid misunderstanding when discussing interrelationships of biologic traits.

The five types of Class II, Division 1 will now be discussed in order.

Protrusion of the Maxillary Dental Arch.—It is admittedly true that in many Class II, Division 1 cases with marked facial involvement, the maxillary dental arch is displaced forward as related to the face and cranium.

In 1937, Young, Johnson, Smyth, and Still[30] reported an investigation into the nature and characteristic features of postnormal occlusion (Class II). This report contained the results of investigations to determine in what respects and to what extent children with well-defined Class II occlusion differ in their facial and dental arch dimensions and relationships from children with normal occlusion at different stages of growth.

The result of the investigation* is stated in the preface to the report as follows:

> Contrary to the general belief, it would appear from the measurements here recorded that the disharmony observed in the jaws and dental arches is due more frequently to excessive forward growth of the upper jaw than to retrusion or undergrowth of the lower jaw. In fully three-fourths of the boys and almost half of the girls examined, the upper jaw appeared to be at fault.

In other words, many Class II, Division 1 cases in the groups examined were maxillary protrusions.

The fact that many Class II, Division 1 cases are maxillary protrusions is evidenced clinically by the marked improvement in facial profile that follows the correction of the anteroposterior malrelationship of the dental arches by the posterior movement of the maxillary dental arch in treatment.

Retrusion of the Mandibular Dental Arch and Mandibular Retrusion.—I use these two terms, "retrusion of the mandibular dental arch" and "mandibular retrusion," advisedly because there is a significant distinction between them, a distinction that is useful in diagnosis. Retrusion of the mandibular dental arch refers to the anteroposterior position of the mandibular dental arch as related to the face and cranium. Mandibular retrusion, on the other hand, refers to the variation in the size, contour or position of the mandible as it affects the facial profile of the individual, giving it a backward divergence. This distinction is necessary in order to differentiate between two conditions which can be present concomitantly but which are not always interrelated. For instance, we may have the mandibular dental arch posteriorly positioned as related to the

*In the words of the investigators: ". . . the selection of about 350 boys suitable for measurement necessitated the examination of 17,500 boys in 85 schools. In the selection of nearly 300 girls with post-normal occlusion 24,000 girls in 112 schools were examined. The fact that not more than 2 per cent of the general population of school children at ages 8-14 years whose mouths were examined were finally considered suitable for measurement gives some indication of the care exercised in, and the stringency of the selection."

face and cranium and still have no mandibular retrusion, that is, no unusual position or condition of the mandible itself. On the other hand, a mandibular retrusion, i.e., an unusual posterior position or condition of the mandible, will always affect the position of the mandibular dental arch as related to the face and cranium. In the former case the two factors are concomitant; in the latter, the position or condition of the mandible is etiological. This is as expected. Since the mandibular dental arch rests upon the body of the mandible, it is conditioned by it in its response to developmental and therapeutic forces.

Retrusion of the Mandibular Dental Arch.—To date we have no means, in the form of a standard, to ascertain this condition. Case[10] included in his classification of malocclusions one type which was based upon this condition and opened up spaces in the mandibular dental arch to insert artificial teeth as a corrective measure. Angle[1] based his definition of Class II, Division 1 upon this premise, the distal position of the mandibular dental arch, and designed his early mechanics to produce a forward movement of the mandibular teeth. Clinically, we find that our corrective mechanics can easily produce a forward movement of the mandibular dental arch, mostly by tipping the teeth, and so bring about a correct occlusal contact between maxillary and mandibular teeth. This, however, is very often accompanied not by an improved facial appearance but by a more disturbed one. In many of these cases, the teeth at the end of treatment are in protrusion as related to the mandibular base. The instability of the denture so treated is stressed by Case:

> . . . it is a regrettable fact that the disto-mesial shifting of the dentures to a normal occlusion in these cases, . . . can very rarely be retained permanently even after having been retained artificially in that position for two years or more. In fact, when this particular Type is treated in this way (intermaxillary elastics) there are no cases in the author's practice that are as difficult to permanently retain, . . .[10]

Mandibular Retrusion.—It is common clinical knowledge that frequently, with the correction of the occlusion in Class II, Division 1 cases, there is a concurrent marked improvement in facial esthetics. The rapidity with which this occurs in some of these cases cannot support the view that growth is responsible for this change. It is more probable that this rapid change in facial contour is due to the release of the entire mandible from its posteriorly locked position where it was held by the incorrect occlusion. This phenomenon has been observed in practice regardless of the type of mechanics used in treatment. Evidently, we are dealing here with an *apparent* or *functional* mandibular retrusion. In this connection we may recall the successfully treated cases by Kingsley's method of "jumping the bite."

In contradistinction to this there is a type of mandibular retrusion associated with many Class II, Division 1 cases that does not react the same way to the usual methods of treatment. In these cases, efforts to effect changes in the facial contour by using mandibular anchorage and Class II elastics meet with varied resistance. The prolonged and persistent use of intermaxillary force to overcome resistance often produces undesirable changes in the mandibular teeth and their surrounding structures ending in the breakdown of

these tissues. It is obvious that we are dealing here with a different type of mandibular retrusion. This type of mandibular retrusion may be called *real* or *structural.*

Bimaxillary Protrusion.—In a paper presented before the Angle Society of Orthodontists in March, 1947,[15] I defined "bimaxillary protrusion" as a dentofacial relationship which, depending upon its degree, either bars or limits the forward movement of the anterior teeth in treatment.

The significance of this definition of bimaxillary protrusion lies in the fact that it limits this term to its clinical implications. According to this definition, bimaxillary protrusion is *not* a malocclusion of the teeth but a term which designates a dentofacial relationship that demands the retraction of the anterior teeth or places limitations upon forward tooth movement in treatment. It may be present with the various forms of malocclusions of Class I, Class II, and Class III, as well as with teeth in correct occlusion.

Bimaxillary protrusion may be *actual* or *potential.* When it is present at the beginning of treatment, we have an actual bimaxillary protrusion and it expresses itself in an objectionable fullness around the mouth. This fullness around the mouth may often be reduced in the correction of the malocclusion. If, in the treatment of the malocclusion the anterior teeth are retracted, there will follow a reduction of the fullness around the mouth. On the other hand, if the anterior teeth are moved forward in treatment, the fullness around the mouth will invariably become aggravated. When it follows orthodontic treatment, it is always due to a forward movement of the teeth in the treatment of a malocclusion that had associated with it a potential bimaxillary protrusion.

A *potential* "bimaxillary protrusion" may be defined as a dentofacial relationship present concomitantly with the malocclusion which will result in an objectionable fullness around the mouth or an actual bimaxillary protrusion if the malocclusion is corrected by a forward movement of the anterior teeth. Many Class II, Division 1 cases are either actual or potential bimaxillary protrusions. It is important to differentiate between the two conditions in treatment. A large number of Class II, Division 1 cases are *maxillary* protrusions. The differentiating dental feature between bimaxillary and maxillary protrusion of Class II, Division 1 is the *overjet.* In bimaxillary protrusion the overjet is slight. In maxillary protrusion the overjet is considerable. If the anteroposterior malrelationship of the dental arches in a maxillary protrusion is corrected by a forward movement of the mandibular teeth, the end result will be an actual bimaxillary protrusion. Maxillary protrusions are, therefore, potential bimaxillary protrusions. More will be said about this later.

What has been said is sufficient to indicate that in Class II, Division 1 we are dealing with several different types of dentofacial relationships. In other words, *Class II, Division 1 cases – are not alike.*

A recognition of the important differences in dentofacial relationships of Class II, Division 1 would naturally demand that the operator endeavor to produce correspondingly different changes with his method of treatment. Thus, to correct a maxillary protrusion, a posterior movement of the maxillary dental

arch would be indicated. A retrusion of the mandibular dental arch would require a forward movement of the mandibular teeth without any changes in the supporting bony base. In a functional mandibular retrusion, the change in the position of the mandible in a forward direction would seem to be the logical requirement. A structural mandibular retrusion would require a change in the position of the mandible or a change in its contour or size. Finally, a bimaxillary protrusion would require the retraction of the maxillary and mandibular anterior teeth. We must not overlook here the fact that while the molar relationship is the same in each of these types, the dentofacial relationship is different. The clinical significance of this fact is that the arch malrelationship must not be corrected without regard for the facial involvement.

Some questions arise. Are all the above changes in the dentofacial complex possible? Can we reposition the mandible at will, in a forward direction? Can we produce changes in the contour or size of any of its parts? Can the possible changes be effected by the use of intermaxillary force?

This brings us to an analysis of Angle's second hypothesis.

Is it true that if the teeth are brought into correct occlusal relationship by a forward movement of the mandibular dental arch "the face and jaws would develop to their ultimate perfection of balance and harmony"? The clinical implication of this hypothesis is that the objectives of treatment of Class II, Division 1 will be attained in *every* case, regardless of the difference in the dentofacial relationship present, if we succeed in producing a correct occlusal relationship between the maxillary and mandibular teeth by a forward movement of the mandibular dental arch.

Does the evidence derived from clinical experience and from recent investigations support the view that the correction of the arch malrelationship of Class II, Division 1 by a forward movement of the mandibular dental arch will produce the optimum in dental and facial esthetics and the maximum probability of a stable result?

Let us examine some of the evidence.

LIMITATIONS OF MANDIBULAR TOOTH MOVEMENT

There are a number of factors that limit tooth movement in orthodontic treatment. Some of these are general and apply to all forms of malocclusion while others are specific and apply to a particular group or individual. Among the factors that either bar or limit the forward movement of the mandibular teeth in the treatment of Class II, Division 1 are the following:

(a) The resistance of morphologic patterns to enforced change.
(b) The dentofacial relationship termed "bimaxillary protrusion."
(c) The factors that make for stability of the treated denture.

Let us take these in order.

The Resistance of Biologic Patterns to Enforced Change.—The facial profile is greatly influenced by the variation in position and inclination of the mandible and by variations in its size and configuration.

Facial Types.—The natural position and inclination of the mandible as related to the face and cranium is conditioned by the interplay of a large number

of factors such as: ramus height, the position of the glenoid fossa of the temporomandibular joint, the length, origin, and insertion of the muscles attached to the mandible, shape of skull, etc. Any marked variation in one or more of these factors will affect the position and inclination of the mandible as related to the face and cranium. When the resultant of the interplay of these variable factors is a marked posterior position or inclination of the mandible, it will express itself in a real or structural mandibular retrusion of varying degrees. The range of variation in the position and inclination of the mandible within apparently healthy limits may be very great. These variations are responsible to a great extent for facial types, and while they are sometimes sufficiently objectionable to justify our decision to modify them, they are not necessarily examples of abnormality. One can readily agree with Moore that "many undesirable biologic traits are fully natural."[22] In this connection, it may be well to bear in mind that barring distorted patterns of growth due to injury, disease, etc., the variability in the directional growth and position of the mandible in individuals with correct occlusion is not unlike that of individuals with malocclusion. Hellman[18] held to this view in the following quotation:

> In a study on facial profiles in 1932, evidence was presented in support of the view that the most prevalent ways in which faces differ in this respect are in forward and backward divergence from a measurable standard. (Fig. 1, *A*, *B*, and *C*.)

Later, in the same article:

> It should be emphasized that these divergencies are not to be construed as abnormal manifestations, since the faces showed no deformities and the teeth were in normal occlusion.

The researches of Brodie have led him to a similar conclusion. He summed up his findings as follows:

> A study of the patterns of individuals revealed that all have the same basic conformation, although various types could be differentiated. In some the face seemed back under the brain case, while in others the opposite was true.[6] (Fig. 1, *D*.)

Broadbent,[4] reporting on the variations in the growth of the face in the various classes of malocclusion, also spoke of faces in nonorthodontic individuals in which growth is in a backward and downward direction. The following quotation is taken from his paper, "The Face of the Normal Child":

> Here is evidence that instead of the normal downward and forward developmental trend during this two year interval, the facial changes have been downward and backward in relation to the unchanged cranial base and outline of the head. This abnormal trend of development has included the eye and ear points as well as the dentofacial points in the lower face. Instances of such aberrant developmental growth have been recorded in untreated as well as treated cases.

There are no statistics available on the incidence of the backward and forward divergence of profiles of individuals with malocclusion of the teeth. It is, however, a clinical fact that the range of profile divergence of individuals with the dentition in Class II, Division 1 malocclusion is not unlike that of individuals with dentitions in normal occlusion or Class I malocclusion. (Fig. 2, *A*, *B*, *C*, and *D*.)

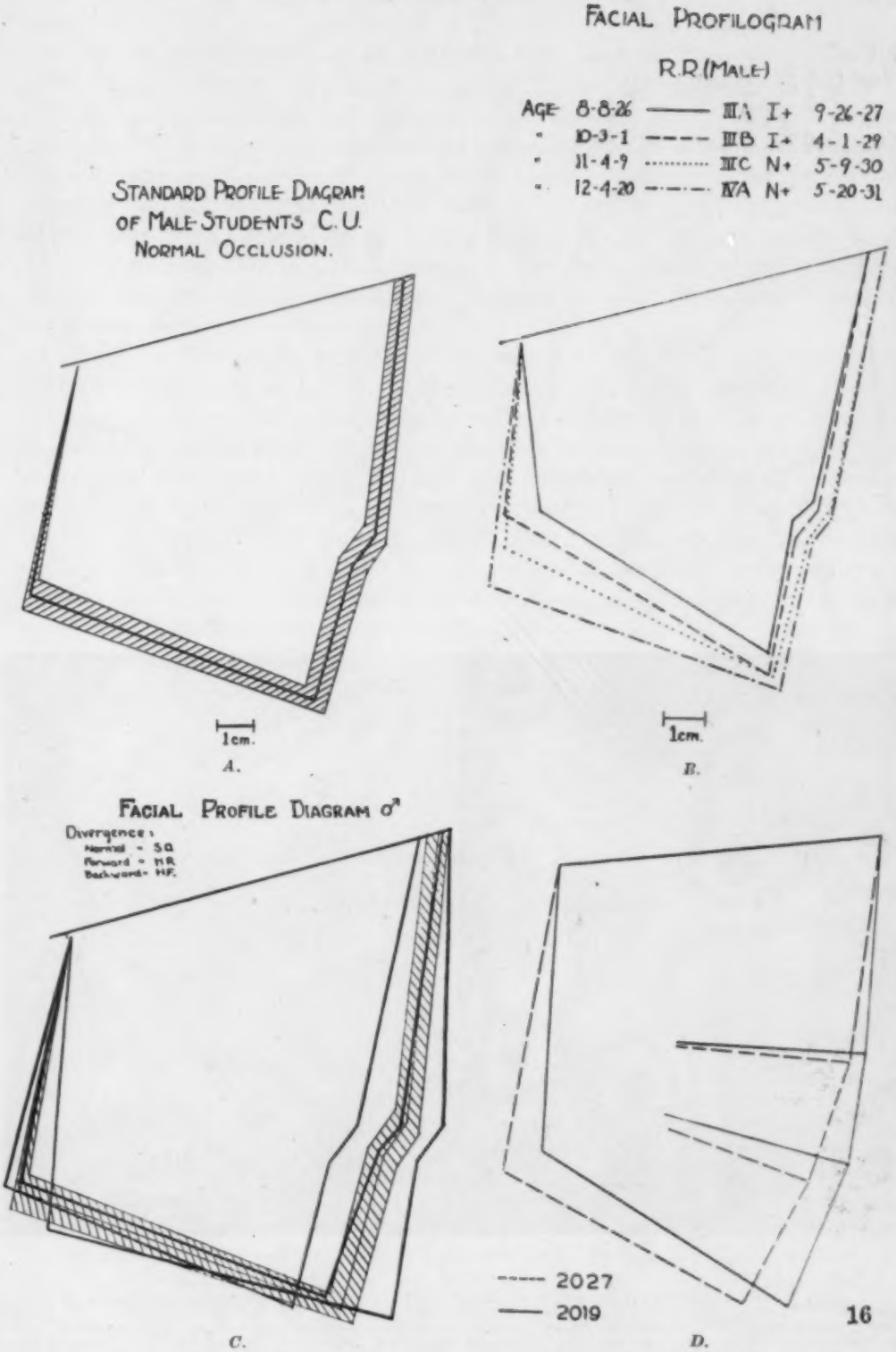
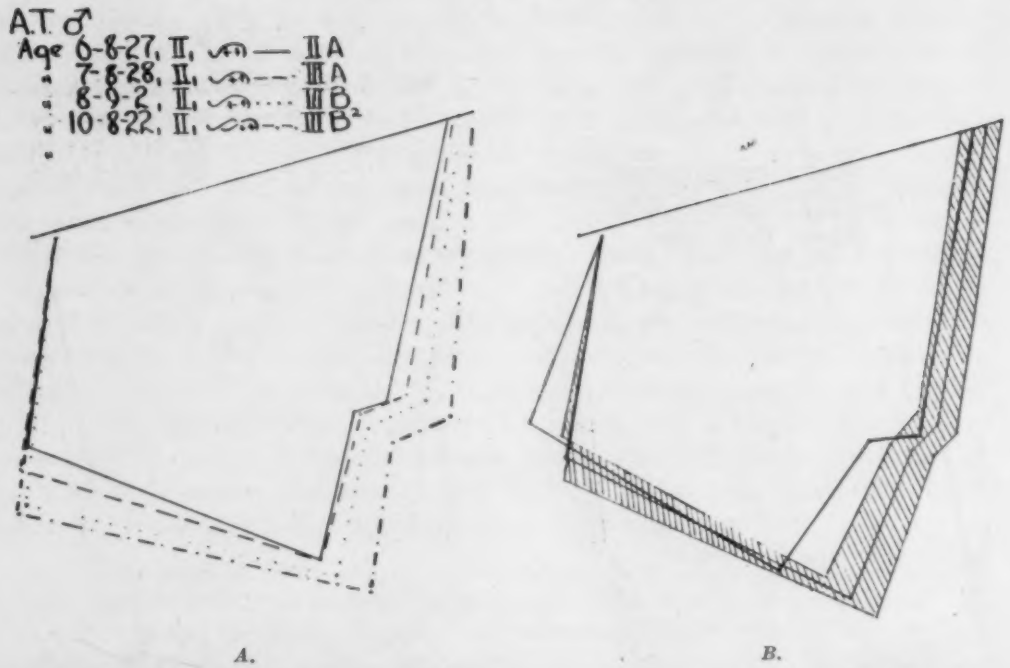
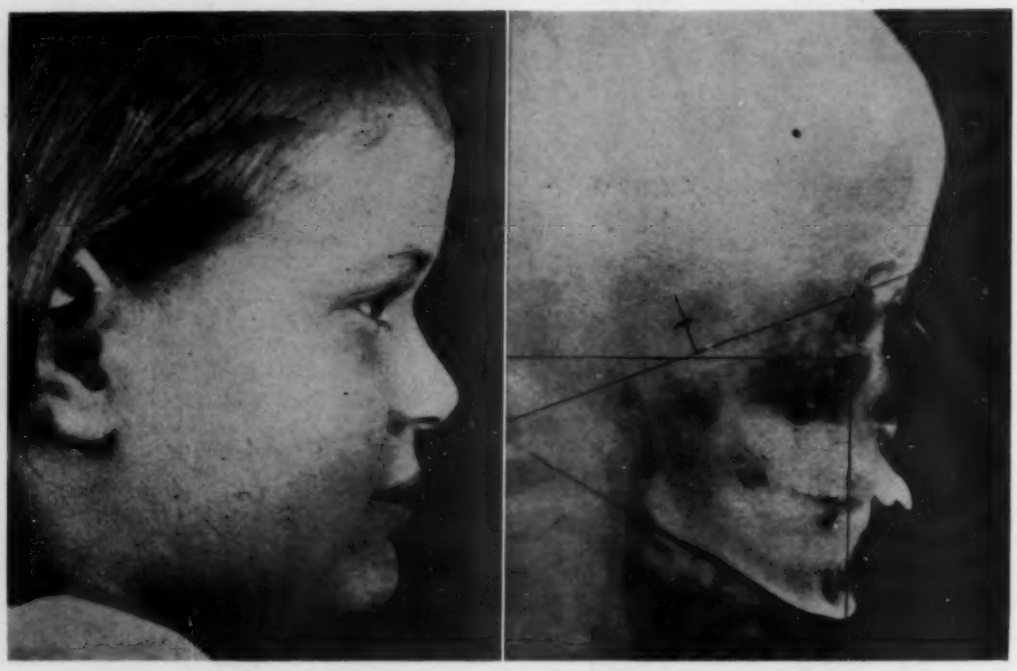


Fig. 1.—Facial profile diagram: dentition in normal occlusion. *A*, Standard from average. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.) *B*, Backward facial divergence. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.) *C*, Three facial profiles: one average, one forward, and one backward divergent. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.) *D*, Two facial profiles: one backward divergent and one forward divergent. (Courtesy, Brodie, A. G.: Am. J. Anat. **68**: 259, 1941.)



A. *B.*



C. *D.*

Fig. 2.—Facial profiles; dentition in Class II, Division 1 malocclusion. *A*, Forward divergent facial profile diagram. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.) *B*, Backward divergent facial profile diagram. Diagram of facial profile at Stage IIIB, showing comparison between the average with its standard deviation (shaded area) of 122 facial dimensions of boys with all kinds of occlusion and G. J. (female), aged 10 years, 8 months, with Class II, division 1. Age of group, 10.91 ± 1.35. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.) *C*. Forward divergent facial profile. (Courtesy, Broadbent, B. Holly: Angle Orthodontist 7: 209, 1937.) *D*. Lateral roentgenogram of patient in *C*. (Courtesy, Broadbent, B. Holly: Angle Orthodontist 7: 209, 1937.)

Intermaxillary Force Cannot Change the Growth Pattern of the Mandible.—Like any other part of the human body, the component structures of the dentofacial complex naturally resist enforced change. Any attempt to change the size or contour of a part beyond its natural limits, or any attempt to change the natural growth pattern, will meet with varied resistance. Derived from the complex interplay of many factors, each of them a variable, the position and inclination of the mandible is as much a part of the individual's pattern as are other morphologic traits. It is, therefore, not surprising that any attempt to change the direction of growth of the mandible meets with unsurmountable resistance and results in failure.

There is nothing novel in all this clinically. We need only point to the wishful thinking when, in the effort to improve the facial profile in Class II, Division 1 cases, attempts are made to produce changes in the size or contour of the mandible, changes in the rate or direction of its growth, or changes in its natural position as related to the face and cranium. The effort to make these impossible changes is justified by some orthodontists upon the grounds that the structure or pattern does not measure up to a standard obtained statistically, while at the same time ignoring the fact that our corrective mechanics cannot possibly modify these structures or patterns in the manner desired. The literature abounds with evidence to support this clinical fact.

Lundström[20] wrote very clearly of the inability to grow bone by the available orthodontic means. He expressed his views on this matter in the following quotation:

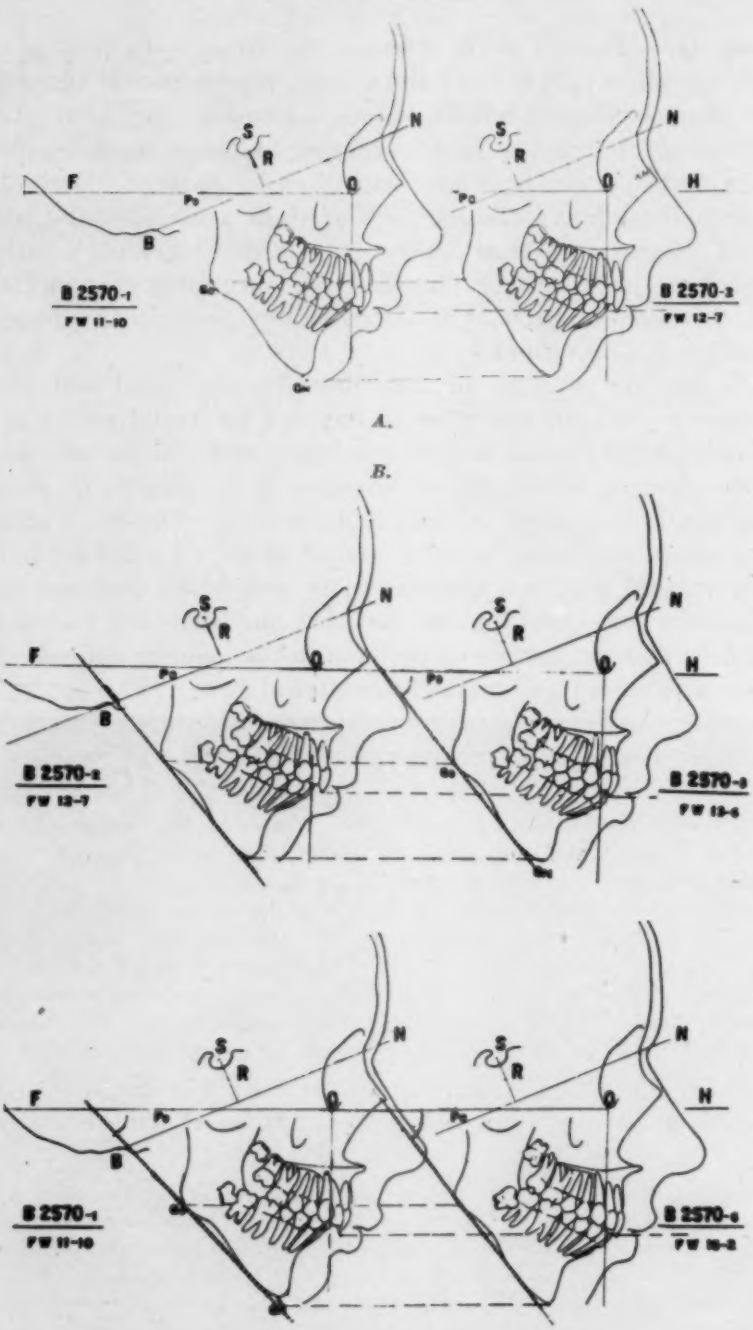
> As is well known, the opinion that it is possible to direct the growth of the maxillary and mandibular bases by means of a specific interlocking of the occlusion, dominated our literature for many years, and apparently many modern textbooks and a number of modern writers take the same view; although several authors and certainly many practitioners are now convinced that its truth is limited. Its advocates fell into the error or exaggeration, and assumed that a certain ideal occlusion, into which the teeth actually could be placed in practically all cases, produced a next to universal success in that the surrounding regions adapted themselves into harmony with this ideal position of the teeth.

Broadbent,[4] speaking on the resistance of biologic tissue to change enforced by orthodontic means, reported the following Class II, Division 1 case. I am quoting from his report:

> Tracings between the beginning of treatment at eleven years and ten months and twelve years and seven months show the changes in dentition that were accompanied by only slight changes in the other structures, principally in the anterior portion of the lower jaw. Between twelve years and seven months and thirteen years and six months when the case was retained there has resulted no further change in the relation of the face to cranium, with the exception of the forward movement of the lower dental arch and a slight change at gonion. After two years of difficult retention, the individual still retained the profile pattern of the face that he had before orthodontic treatment was commenced, except for a slight change in the soft tissue profile and the relation of the mandible to the maxilla. (Fig. 3, *A*, *B*, and *C*.)

Brodie[6] expressed a similar view:

> The most important single finding is that the morphogenetic pattern of the head is established by the third month of postnatal life, or perhaps earlier, and that once attained it does not change.



A.

B.

C.

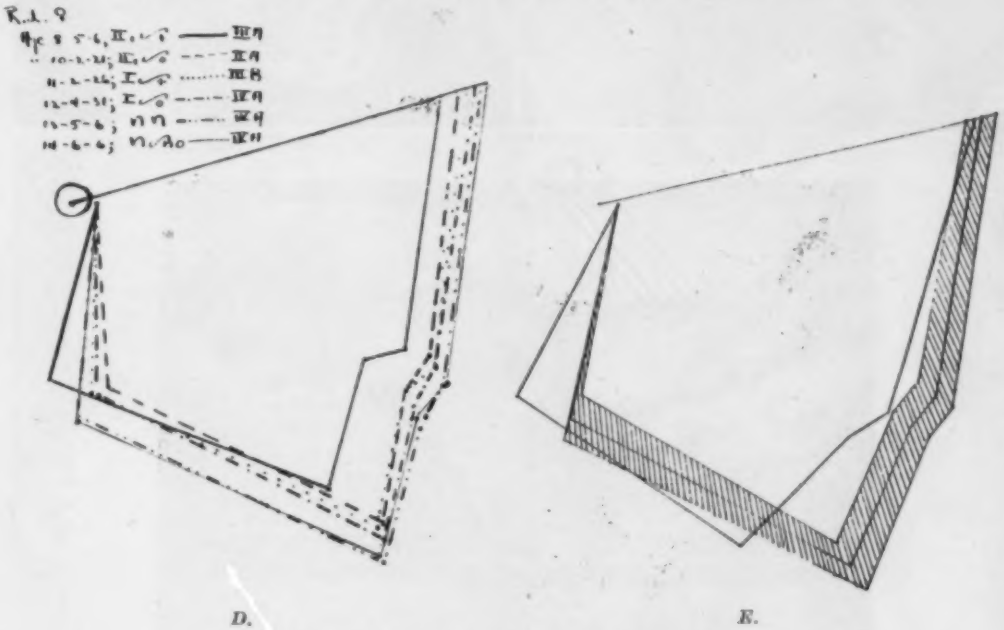
Fig. 3.—Facial profile diagrams; dentition in Class II, Division 1 malocclusion; changes during treatment. *A*, Tracings of lateral roentgenograms of B. 2570 at 11 years, 10 months and 12 years, 7 months. (Courtesy, Broadbent, B. Holly: Angle Orthodontist 7: 209, 1937.) *B*, Same case B. 2570 at 12 years, 7 months and 13 years, 6 months. (Courtesy, Broadbent, B. Holly: Angle Orthodontist 7: 209, 1937.) *C*, Same case B. 2570 at 11 years, 10 months and 15 years, 2 months. (Courtesy, Broadbent, B. Holly: Angle Orthodontist 7: 209, 1937.) *D*, Forward development during treatment. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.) *E*, Backward development during treatment. Diagram of facial profile at Stage IVA, showing comparison between the average with its standard deviation (shaded area) of 156 facial dimensions of boys with all kinds of occlusion and G. J. (female), aged 14 years, 7 months, 20 days, after treatment of Class II, division 1. Age of group, 14.78 ± 2.07. (Courtesy, Hellman, Milo: The Dental Cosmos, 1936.)

These and other recent studies and observations on the growth pattern of the face suggest a classification of faces into two types:

Type I, forward divergent.

Type II, backward divergent.

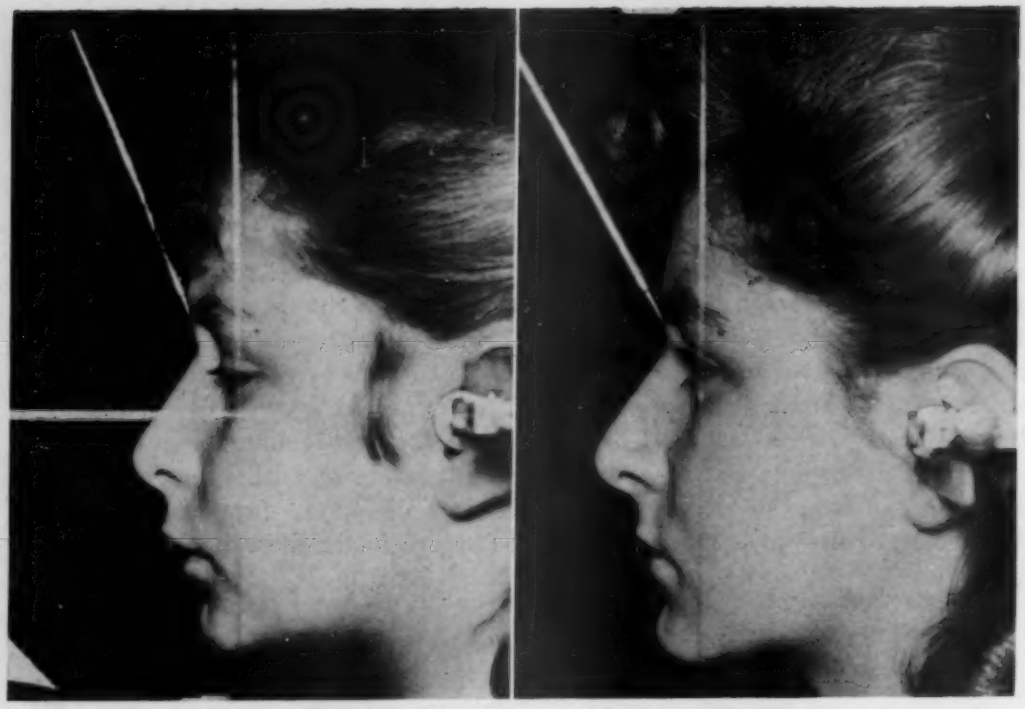
Here again it must be emphasized that these two types exist in orthodontic as well as in nonorthodontic individuals in gradations ranging from an extreme forward divergent to an extreme backward divergent face. There are no sharp lines of division. Since one type cannot be changed into the other (Fig. 4), it is fallacious to judge the degree of backward divergence by comparing a Type II face with a standard obtained from the best-looking faces of Type I (forward divergent) or even from a mixed sample of both types. To do so leads to the error of designating the forward divergent face as *normal* and the backward divergent face as *abnormal* (as seen in the literature).



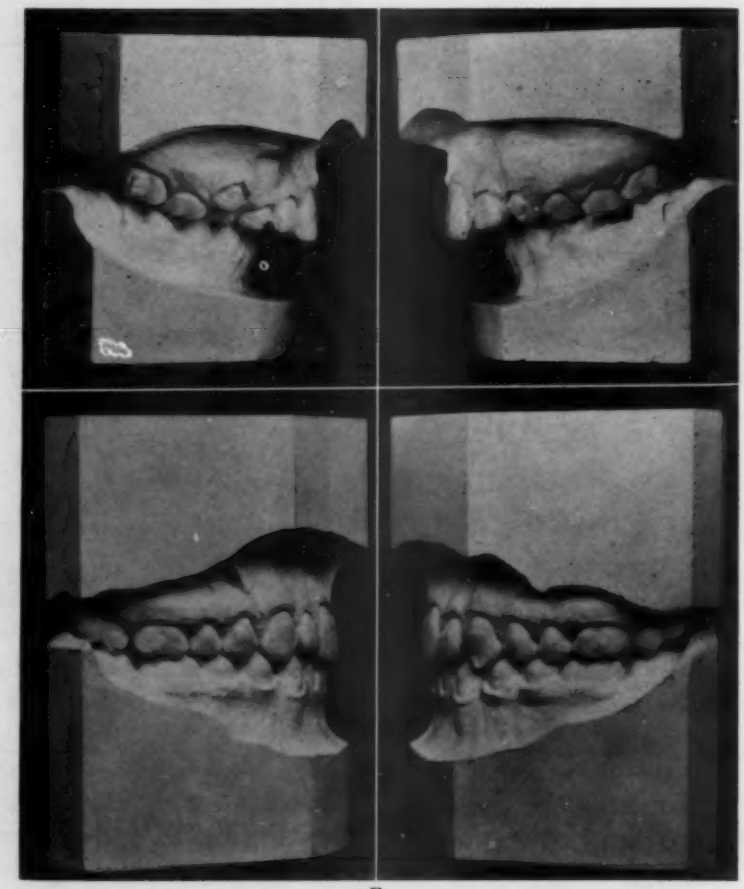
D. *E.*

Fig. 3.—*D* and *E* (*For legend, see opposite page*).

It is not necessary for the present discussion to describe the various techniques used to ascertain the facial type under observation or treatment. It is sufficient to point out at this time that their recognition is of utmost clinical importance in the treatment of Class II, Division 1. Many structural mandibular retrusions of Class II, Division 1 are the result of a backward divergent face. The size and configuration of the mandible in these cases may compare favorably with a standard of "normals" obtained statistically. Yet the face has a chinless appearance. A structural mandibular retrusion may also be the result of a relatively small body of the mandible or some marked variation in its shape or form. In these cases, the position and inclination of the mandible may compare favorably with a standard of "normals" obtained statistically; yet the result again will be a backward divergent face. The range of morphologic variations in the structures that compose the lower face and the compensatory



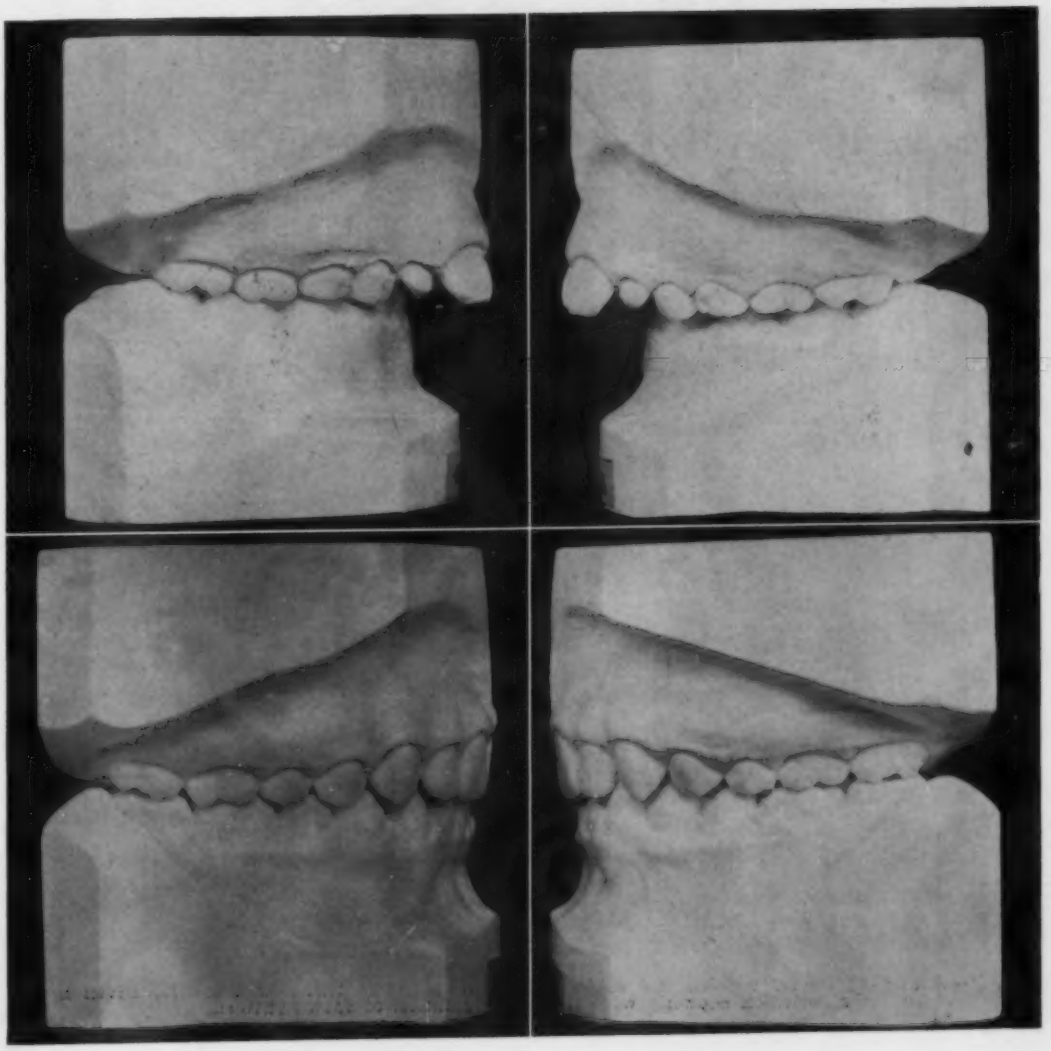
A.



B.

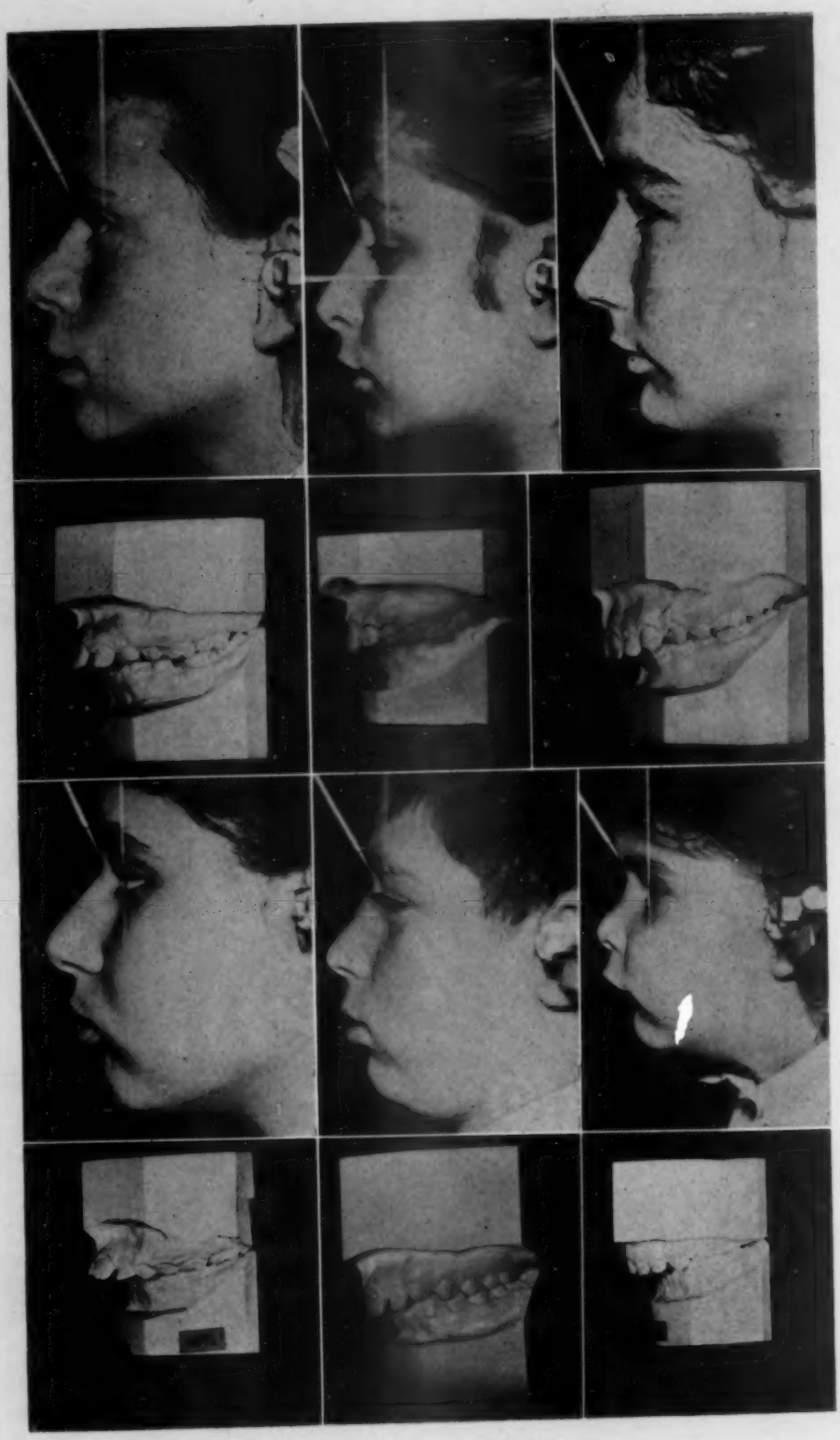
Fig. 4.—Two successfully treated cases of Class II, Division 1 malocclusion showing no change of facial type. *A, Case 499.* Type I (forward divergent). Profile before and after treatment. *B,* Casts before and after treatment. *C, Case 499.* Type II (backward divergent). Profile before and after treatment. *D,* Casts before and after treatment.

C.



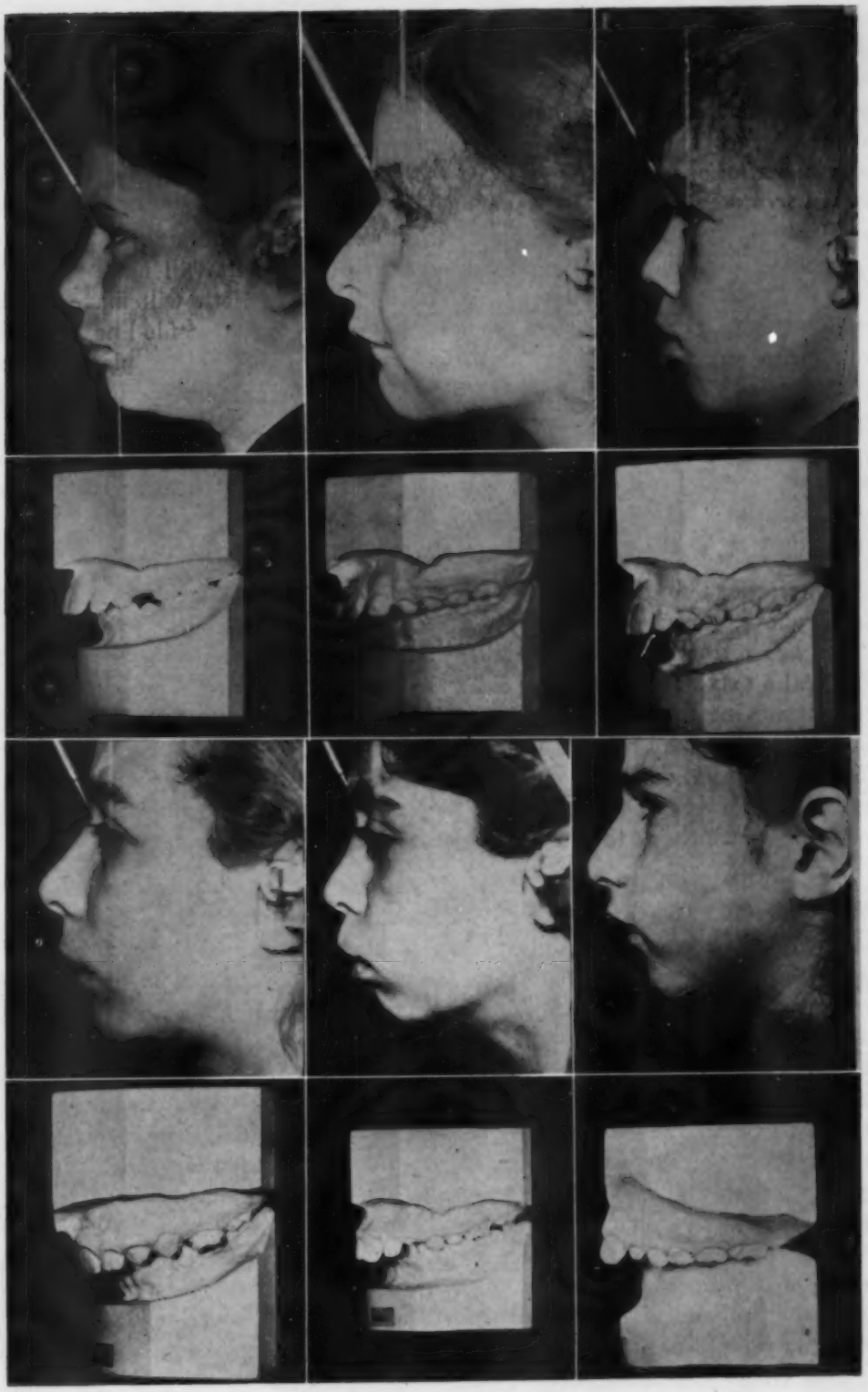
D.

Fig. 4.—*C* and *D* (*For legend, see opposite page*).



A.

Fig. 5.—*A* and *B*, Facial profiles and casts of patients with dentition in Class II, Division 1 malocclusion showing wide range of variation of facial pattern.



B.

Fig. 5.—*(For legend, see opposite page).*

adjustments of interrelated parts that may result in a Type I or a Type II face are unlimited. (Fig. 5.) The phenomenon is a very complex one and the knowledge of how it came about in a particular individual is altogether irrelevant to treatment. It is, however, important to remember that *a backward divergent face and the resistance of the mandible to enforced change place certain limitations upon the forward tooth movement in the mandibular dental arch in treatment.*

In cases of Class II, Division 1 with a structural mandibular retrusion, the forward movement of the mandibular teeth in treatment will not produce the desired changes in the lower jaw. The mandibular teeth will move forward leaving the bony base in an unchanged relationship to the profile line. This will result in a mandibular dental arch unsupported to the stresses placed upon it by function. The unnatural forward position of the mandibular teeth will also accentuate the chinless appearance of the patient.

From the evidence presented, our conclusion must necessarily be that it is not true as Angle asserted that if the teeth are brought into correct occlusal contact by a forward movement of the mandibular teeth "the face and jaws would develop to their ultimate perfection of balance and harmony."

Limitations to Forward Tooth Movement in Bimaxillary Protrusion.—As stated above, the successful treatment of an actual bimaxillary protrusion requires the retraction of the maxillary and mandibular anterior teeth. In the potential bimaxillary protrusion cases the arch malrelationship must be corrected without moving the mandibular incisors forward. These limitations placed upon forward mandibular tooth movement in treatment make it necessary to correct the arch malrelationship of actual bimaxillary protrusion cases with a Type II or backward divergent face and all potential bimaxillary protrusion cases by a posterior movement of the maxillary dental arch.

Limitations Placed Upon Tooth Movement by the Factors That Make for Stability of the Treated Denture.—The relative stability of the denture in function is the resultant of the interplay of a large number of factors or forces in the dentofacial complex which have come to an active equilibrium. The stability or permanence of result unfortunately cannot be predicted with any degree of assurance. We simply do not possess the information necessary that would enable us to predict the performance of our treated cases. However, notwithstanding the complexity of the phenomenon, there are some factors that are known to make the permanence of results of treatment more probable than others. Some of these may be stated as follows: First, the probability that a denture will remain stable is greater when the teeth have not been tipped or moved beyond tolerable limits off their bony bases;[11, 29] second, the probability that a denture will remain stable is greater if the size and form of the dental arches of the malocclusion are not radically changed during the treatment;[26] third, the probability that a denture will remain stable is greater if concomitant habits such as finger- thumb- or tongue-sucking have been corrected and discontinued during treatment than if they are still present at the end of treatment. The first and second of these factors are relevant to the present discussion. These factors limit the forward tooth movement in the mandibular dental arch

in treatment. In a large number of Class II, Division 1 cases, the mandibular incisors present a marked labial axial inclination. To move these teeth forward in treatment will result in an unstable denture which will relapse after all artificial support has been discontinued.

CLASS II, DIVISION I
SUMMARY OF DIAGNOSIS

DENTOFACIAL RELATIONSHIP	DIFFERENTIAL CRITERIA		
	FACIAL TYPE*	FACIAL	DENTAL
Maxillary Protrusion	TYPE I or TYPE II	Protrusion of upper lip or fullness around the mouth	Protruding maxillary incisors Great variation in incisor - mandibular plane angle OVERJET marked to extreme
Bimaxillary Protrusion	TYPE I or TYPE II	Fullness around the mouth always present	OVERJET slight
Mandibular Retrusion Structural	TYPE II only	Chinless appearance	OVERJET varies from slight to extreme OVERBITE usually slight
Functional	TYPE II only	Chinless appearance	OVERJET varies from slight to extreme OVERBITE varies from marked to extreme
Retrusion of mandibular dental arch†	TYPE I only	Good chin Lower lip against incisal edges of upper front teeth Deepened labiomental depression	Pronounced retrusion of lower denture with the upper normal

* TYPE I - forward divergent
TYPE II backward divergent

† Similar to Case's Type A, Division I, Class II described in Calvin S Case "Dental Orthopedia," pp 249-254

Fig. 6.—Summary of diagnosis.

MANDIBULAR ANCHORAGE

From the previous discussion of the factors that limit forward movement of the mandibular teeth, it is obvious that the orthodontist must obtain his objectives of treatment by producing the necessary changes in the dentofacial complex, within these limitations.

In maxillary protrusion, his mechanics must produce a posterior movement of the maxillary dental arch.

In structural mandibular retrusion, the arch malrelationship must again be corrected by a posterior movement of the maxillary dental arch, since it is not

possible to produce the desirable changes in the mandible itself or in its natural relationship to the face and cranium.

In "bimaxillary protrusion" cases, he must correct the arch relationship without forward movement of the mandibular teeth, and very often a posterior movement of the mandibular incisors is indicated in these cases.

To work within these limitations upon forward movement of the mandibular teeth means that in a large number of cases of Class II, Division 1 the anteroposterior malrelationship of the dental arches must be corrected by moving the maxillary dental arch posteriorly if the objectives of treatment are to be attained without substituting one undesirable trait for another.

With the reciprocal character of intermaxillary force, the only way that the desired posterior tooth movement of the maxillary dental arch without the forward movement of the mandibular teeth can be ensured is through controlled resistance or anchorage in the mandibular dental arch. This brings us to a consideration of mandibular anchorage and its reaction to intermaxillary force.

In the absence until recently of a standardized method of appraisal of orthodontic results, it was not possible to estimate with any degree of accuracy the behavior of mandibular anchorage to the pull of Class II elastics.

In 1938, Brodie, Goldstein, and Myer[9] published the first cephalometric appraisal of a number of Class II, Division 1 cases treated with intermaxillary elastics. They followed Angle's method in the use of the edgewise appliance and did not prepare anchorage in the mandibular dental arch as advocated by Tweed. Their report confirmed cephalometrically what for a long time was observed clinically—that the mandibular dental arch gives way while the maxillary dental arch remains relatively stationary when Class II elastics are used. The mandibular teeth always move forward and very often to an objectionable degree. In a large number of cases, this results in an extreme mesial axial inclination of the mandibular teeth with the incisors off their bony base producing an objectionable fullness around the mouth, an accentuated chinless appearance of the patient, and an unstable denture. In other words, mandibular anchorage as generally used does not offer sufficient resistance to move the maxillary dental arch posteriorly.

In 1940, Goldstein and Myer[17] published an additional cephalometric report of studies in Class II treatment. This report revealed three important findings. First, the same operators who in 1938 had stressed the inability to move the maxillary dental arch posteriorly reported two years later cases in which a change of mechanics made this posterior movement possible. The second is that the corrected occlusion in these cases was the result of two dentofacial changes: (a) the posterior movement of the maxillary dental arch and (b) the repositioning of the entire mandible. Third, and this is most important, in all of the cases *the mandibular teeth were moved forward* by the intermaxillary force.

"Prepared" Mandibular Anchorage.—In 1936, Charles H. Tweed[27] published his method of preparing mandibular anchorage. Mandibular anchorage preparation was a natural outgrowth of Tweed's basic principles. The uprighting of the mandibular incisors and placing them over basal bone, as well as the change in the axial inclination of the teeth, are related to his concept of dental

and facial esthetics and stability of the end result. He, therefore, advocated mandibular anchorage preparation as an important step in the treatment of malocclusions of all classes. The concept is clearly defined by Tweed[28] in the following quotation taken from one of his papers published in 1941:

> By anchorage preparation I mean the placing of the mandibular incisors up over the basal bone, and rearranging the axial inclination of the teeth in the buccal segments, from cuspid to second molar when possible, in such a manner as to create toe-hold to combat any tendency toward mesial drift of the teeth in the buccal segments when intermaxillary force is applied.

In other words, the purpose of anchorage preparation in Class II, Division 1 is to build up sufficient resistance in the mandibular dental arch in order to correct the arch malrelationship by a posterior movement of the maxillary teeth. Tweed[28] very clearly indicated this latter tooth movement as one of the objectives sought in his treatment plan for this class. He said:

> The treatment should be divided into three stages, viz.: (1) The preparation of a more stable form of stationary anchorage in the lower arch and the elimination of toe-hold or stationary anchorage in the upper arch. (2) Distal en masse movement of the maxillary teeth, along with the development of the body of the mandible without forward displacement of the mandibular teeth. (3) Detailed positioning and arch form prior to retention.

Since mandibular anchorage preparation very often involves extraction of teeth, it is necessary to analyze some cases treated without extraction and some cases treated with extraction.

"Prepared" Mandibular Anchorage Without Extraction.—The appraisal of orthodontic results of Class II, Division 1 in which mandibular anchorage was prepared without the extraction of teeth showed that in a large number of cases the corrected arch relationship is the result of a simultaneous forward movement of the mandibular dental arch and a posterior movement of the maxillary dental arch (Fig. 7). The superposed graphs before and after treatment (Fig. 7, *D* and *E*) show that while the mandibular teeth have come forward the maxillary teeth have been moved posteriorly. The pull of intermaxillary Class II elastics also changed the axial inclination of the mandibular incisors. How the mandibular incisor-axial angle[12] has changed during treatment is shown in Fig. 7, F. Anchorage preparation was accomplished without the extraction of teeth. The angle at the beginning of treatment equaled 124°. The angle at the end of mandibular anchorage preparation was reduced to 111°. After the correction of the arch malrelationship by means of intermaxillary elastics, the angle increased to 128°. This angle at the end of treatment was 4° larger than at the beginning of treatment.

The simultaneous posterior movement of the maxillary arch is also evidenced by the displacement of the unerupted maxillary molars in treatment. Cases in which the second permanent molars are included in the assemblage show either displacement or impaction of the third maxillary molars. In younger patients where the second permanent molar is not fully erupted to be included in the assemblage, these molars are often forced out of alignment by the posterior movement of the maxillary dental arch.

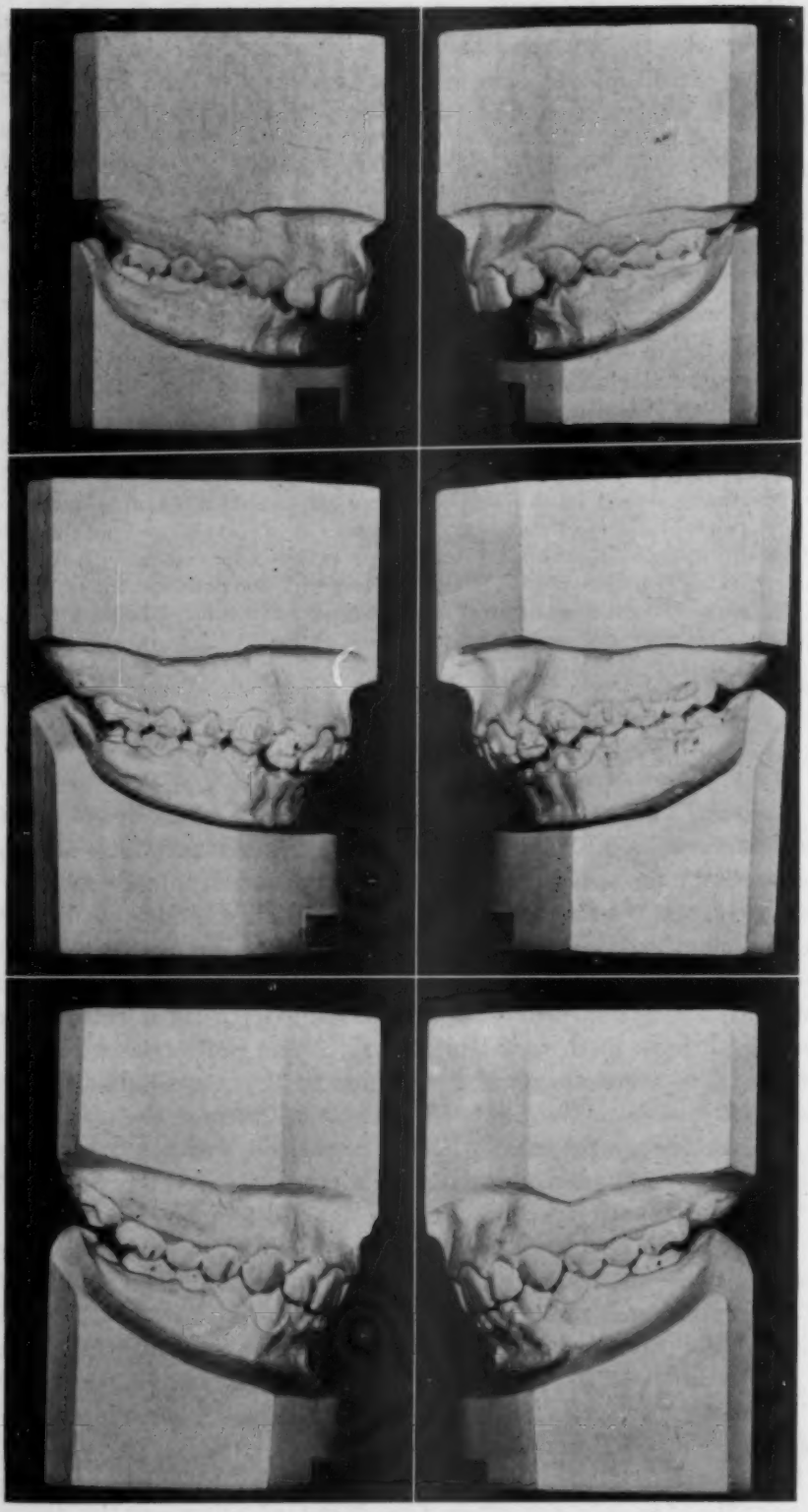
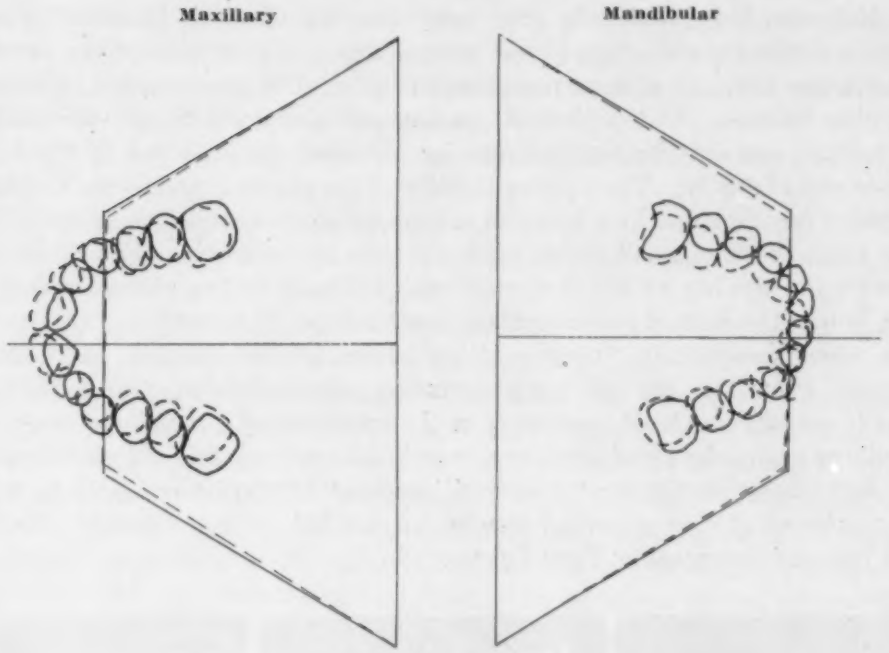
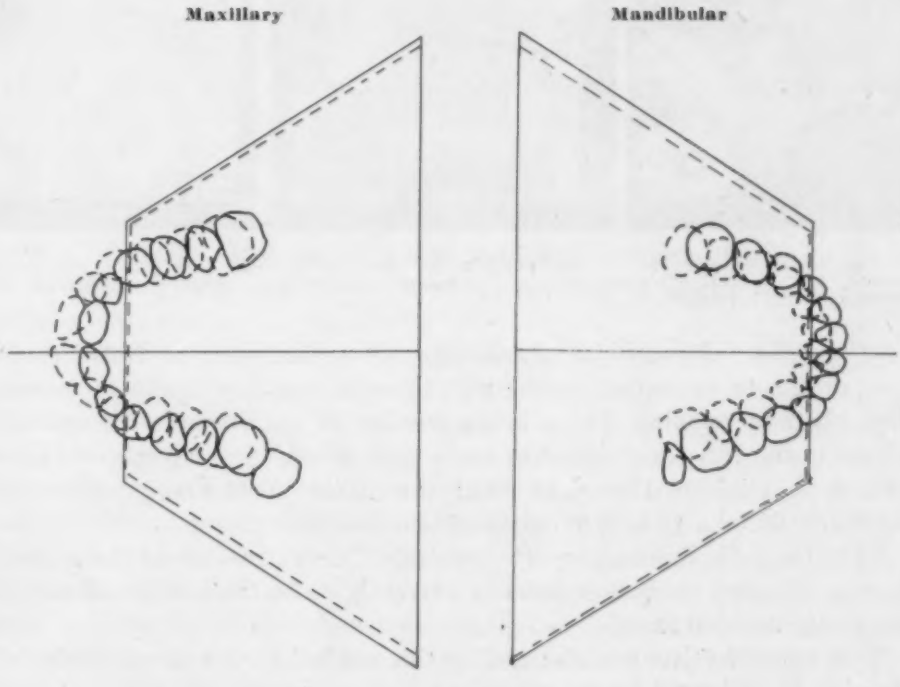


Fig. 7.—*Case 56½*. *A*, Casts at beginning of treatment. *B*, Casts at end of mandibular anchorage preparation. *C*, Casts at end of treatment.



D.



E.

Fig. 7.—*D* and *E*, *Case 564*. - - - - - -, before treatment; ————, after treatment. *D*, Superposed graphs showing relative position of teeth at the beginning of treatment and at the end of anchorage preparation. *E*, Superposed graphs showing relative position of teeth at the beginning and at the end of treatment.

However, it is admittedly true today that the Class II, Division 1 cases in which mandibular anchorage can be successfully prepared without the extraction of teeth are few. In a large percentage of cases it is accompanied by some undesirable features. Unless there is spacing between the teeth, the uprighting of the incisors can only be accomplished by widening the arch and by tipping the incisor roots labially. The tipping distally of the canines, premolars, and molars is always accompanied by a forward movement of the roots of these teeth. Also, very often the unerupted molar teeth distal to the assemblage become impacted through the tipping of the posterior teeth. The most important finding, however, is that the pull of intermaxillary force moves the mandibular arch forward even when successfully "prepared" by means of the headcap and Class III elastics. From this, the following conclusion may be drawn: *Due to the limitations to mandibular tooth movement in the treatment of bimaxillary protrusions, maxillary protrusions and structural mandibular retrusions, intermaxillary force and mandibular anchorage "prepared" without extraction can only be used in the treatment of a very limited number of selected cases of Class II, Division 1 with forward divergent or Type I faces.*

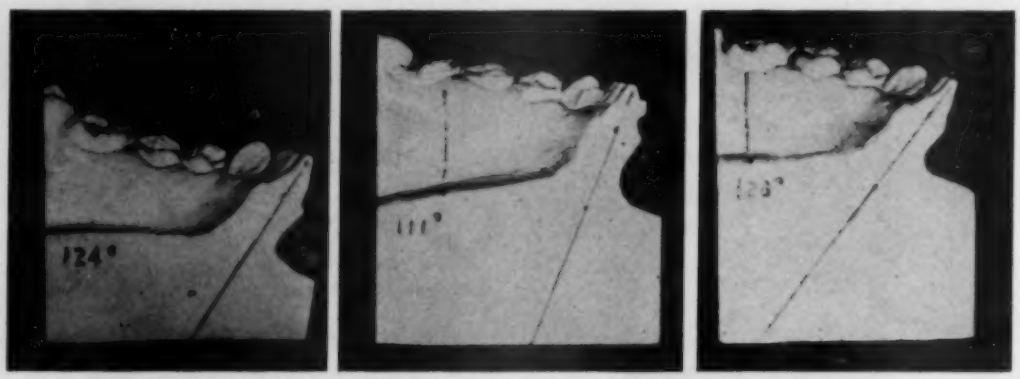


Fig. 7.—*F*, Photograph of sectioned casts showing incisor-axial angle; beginning of treatment, 124° (left), after mandibular anchorage preparation, 111° (center), and at end of treatment, 128° (right).

"Prepared" Mandibular Anchorage With Extraction.—Notwithstanding the opposition to extraction on the part of some members of the profession, the undeniable fact remains that a large number of cases cannot be treated successfully if the full complement of teeth is retained. On the other hand, there are Class II, Division 1 cases in which the extraction of first premolars in the mandibular dental arch is definitely contraindicated.

Extraction in Bimaxillary Protrusion.—The extraction of four first premolars and Tweed mechanics appears currently to be the best treatment for bimaxillary protrusion cases.

That our objectives are attained by this method of treatment of bimaxillary protrusion is evidenced by the many successfully treated cases. However, these objectives are not attained by a posterior movement of the maxillary dental arch due to an increased resistance of mandibular anchorage to intermaxillary force. The records of Class II, Division 1 bimaxillary protrusion cases, treated by extracting four first premolars and with the use of Tweed mechanics, show that

the corrected arch relationship is *not* the result of a posterior movement of the maxillary buccal teeth, if intermaxillary force is used. The achieved result is due to a repositioning of the teeth in each dental arch with a forward movement of all the posterior segments. The rearrangement of the teeth is made possible by the extraction of the four premolars, and is as follows:

(a) The canines are moved posteriorly a small distance into the premolar space.

(b) The incisors are uprighted.

(c) Both the maxillary and mandibular posterior teeth are moved forward most of the way into the premolar space.

(d) The molar relationship is corrected by the relatively greater forward movement of the mandibular posterior segment.

The simultaneous posterior movement of the anterior segment and forward movement of posterior segments in each arch is accomplished, as you know, by the use of intramaxillary force derived from contraction loops placed opposite the sites of the extraction. The corrected molar relationship is the result of the controlled forward movement of the maxillary and mandibular posterior teeth. Intermaxillary force is used to control this forward movement toward the attainment of a Class I molar relationship. After the premolar spaces are closed, the continued use of intermaxillary force will correct the arch malrelationship that is still present by a forward movement of the entire mandibular dental arch.

This is the typical tooth movement that is responsible for the changes in the dentofacial complex that follow the treatment of bimaxillary protrusion cases of Class II, Division 1 in which four first premolars are extracted. The part played by intermaxillary force is not in moving the maxillary posterior teeth posteriorly but rather in controlling the forward movement of both the maxillary and mandibular posterior teeth so that a Class I relationship is obtained.

Attempts to treat bimaxillary protrusion cases without extraction generally end in failure. Even occipital force which I use extensively cannot possibly reduce an actual bimaxillary protrusion of Class II, Division 1 without the extraction of teeth. However, it is important to stress here that from the treatment standpoint there is a great difference between bimaxillary and maxillary protrusion cases of Class II, Division 1.

The failure to differentiate between *bimaxillary protrusion* and *maxillary protrusion* of Class II, Division 1 is, I think, responsible for some of the differences of opinion regarding extraction in treatment. Unlike bimaxillary protrusion, the successful treatment of which usually requires the extraction of four first premolars, the extraction of mandibular first premolars in a well-defined maxillary protrusion case complicates treatment and invites failure. Besides, a large number of well-defined maxillary protrusion cases can be successfully treated without extraction of mandibular teeth if occipital anchorage replaces mandibular anchorage in treatment. I stress *well-defined* cases because, as stated earlier in the paper, agreement is possible in the extreme cases. The problem of extraction, therefore, in the middle range will remain a matter of individual judgment.

Extraction in Maxillary Protrusion.—While the extraction of four first premolars in treatment facilitates the retraction of the maxillary and mandibular

anterior teeth, it also introduces a number of variable factors that are difficult to predetermine and control in treatment. One of the most vexing variables is the final position of the mandibular incisors and canines. The relative position of these teeth to the mandibular base, to the posterior segments, and to the maxillary anterior teeth must be such as not to interfere with the attainment of a correct interlocking of the teeth when the spaces are closed.

In bimaxillary protrusions of Class I in which the extraction of four first premolars is the only way that the objectives of treatment can be obtained, constant vigilance on the part of the operator is required if he is to end up with a correct occlusion. Without a definite criterion to guide him, the synchronized movement of six dental segments in three planes makes the technique anything but easy, notwithstanding the fact that the arch relationship is a correct one to start with. Even with all the care given, some cases will require spacing on one side or both in order to get interdigitation of cusps. Bilateral asymmetry of tooth material or asymmetry of maxillary and mandibular tooth substance may be one of the causes; error in the positioning of the mandibular incisors is another.

The arch malrelationship of Class II, Division 1 brings in additional variables and complicates those that are already present. The reciprocal action of the *intramaxillary* force used for the closing of the premolar spaces must here be carefully controlled by the use of *intermaxillary* force in order to obtain a Class I relationship at the end of treatment. Since the final location of the mandibular incisors cannot be predetermined with any degree of accuracy nor the desired position held during treatment, any error in judgment or in technique made by the operator will upset the interrelationship of the various segments. This will prevent him from obtaining the desired interdigitation between the maxillary and mandibular teeth.

Another disturbing variable is the *overjet*. The differentiating dental feature between bimaxillary and maxillary protrusion of Class II, Division 1 is, as stated previously, the overjet—the anteroposterior distance between the maxillary and mandibular anterior teeth.

In bimaxillary protrusion of Class II, the use of intermaxillary force before the closure of the premolar spaces will help in the forward movement of the mandibular premolars and molars while the mandibular anterior teeth are being retracted by the looped appliance. As soon as the premolar spaces are closed, however, the continued use of the intermaxillary force for the final correction of the arch malrelationship that is still present will move the entire mandibular arch forward, including the incisor teeth. Because the overjet in bimaxillary protrusion cases is slight, this forward movement of the mandibular arch may not affect appreciably the end result in patients with Type I or forward divergent faces. However, in patients with Type II or backward divergent faces, even this slight forward movement of the mandibular incisors is undesirable.

In maxillary protrusions, the overjet is always marked. If mandibular first premolars are extracted and the mandibular six anterior teeth are retracted, the overjet is further increased. The end result is an unnatural and unsightly lingual inclination of the maxillary incisors with an extreme anterior overbite.

In order to avoid this, operators try to retract the mandibular incisors and canines to take up only a very small part of the extracted premolar space, and the mandibular posterior teeth are moved forward to take up most of the space. Intermaxillary force is used to effect this relative forward movement of the mandibular posterior segments. Extreme caution must be exercised in the use of this force at this stage in order to prevent any premature retraction of the six maxillary anterior teeth or an excessive lingual axial inclination. Should such a premature movement of the maxillary anterior teeth occur, it will prevent a correct locking of the posterior teeth.

In the finishing stage, the attainment of a correct occlusal relationship again depends a great deal upon the overjet present at the time. The overjet must be equal to the distance that the maxillary arch must be moved posteriorly in order to seat the cusps. If the overjet is less, the mandibular incisors will interfere with the seating of the cusps in the final correction of the arch relationship, and a correct occlusal contact between the maxillary and mandibular teeth cannot be obtained. If the overjet is sufficient to allow the seating of the cusps in their correct relationship, the corrected occlusion is the result of a forward movement of the mandibular dental arch if intermaxillary force is used in this final stage of treatment.

Therefore, to treat maxillary protrusions of Class II, Division 1 by the extraction of four first premolars and intermaxillary elastics is to invite failure. Extraction may sometimes be necessary in these cases in order to regulate a crowded mandibular arch. However, the mandibular arch so regulated cannot be used as anchorage for the use of intermaxillary force.

Extraction in Structural Mandibular Retrusion.—Earlier in this paper I showed why structural mandibular retrusion cases must be treated as maxillary protrusions. The labial inclination of the incisors as measured from the Frankfort plane is always marked in these cases. This is true even when there is present an incisor-mandibular plane angle of 90° or less. The reason for this is obvious when we realize that the procumbency of the incisors is conditioned by the position and inclination of the mandible itself. The possibility that the procumbency of the mandibular incisors in structural mandibular retrusion cases may be due to a compensatory mechanism must not be overlooked. It appears as if the mandibular incisors were trying to make occlusal contact with the maxillary anterior teeth and that the labial axial inclination is at least partially the result of this effort. The use of intermaxillary force will pull the mandibular teeth off their bony base and produce an undesirable labial inclination of the mandibular incisors without changing the positional relationship of the mandible to the profile line. If anything, this will accentuate the chinless appearance of the patient. In cases with marked overjet, extraction in the mandibular dental arch is hazardous. If first premolars are extracted, the overjet will be increased and it will be impossible to retract the maxillary anterior teeth bodily to make contact with the mandibular incisors. Prognosis for these cases is bad if intermaxillary force is used for the correction of the arch malrelationship. All the difficulties encountered in the treatment of maxillary protrusions by extraction of four first premolars

and the use of intermaxillary force will be accentuated in the treatment of structural mandibular retrusion cases.

Extraction of mandibular teeth may sometimes be necessary in order to regulate a crowded arch, or if the overjet is such that the mandibular incisors will interfere with the retraction of the maxillary arch. The use of intermaxillary force, however, is definitely contraindicated.

CLASS II, DIVISION I
SUMMARY OF TREATMENT

DENTOFACIAL RELATIONSHIP	FACIAL TYPE *	TREATMENT			
		DESIRED TOOTH MOVEMENT		Extraction	Type of Force Used For Correction of Arch Relationship
		Mandibular	Maxillary		
Maxillary Protrusion	TYPE I or TYPE II	NO FORWARD movement	Retraction	EXTRACTION may be necessary in maxillary dental arch NO EXTRACTION in mandibular dental arch	Occipital force on maxillary dental arch
Bimaxillary Protrusion	TYPE I or TYPE II	Retraction	Retraction	EXTRACTION of four first premolars usually necessary	Type I. Intermaxillary force may be used Type II: Occipital force preferable
Mandibular Retrusion Structural	TYPE II only	NO FORWARD movement	Retraction	EXTRACTION in maxillary dental arch may be necessary NO EXTRACTION in mandibular dental arch	Occipital force on maxillary dental arch
Functional	TYPE II only	Leveling of occlusal plane If retrusion persists, treat as structural retrusion			
Retrusion of mandibular dental arch	TYPE I only	Forward movement without labial tipping	Retraction without tipping incisors lingually	EXTRACTION of 2nd or 3rd molars may be necessary in maxillary dental arch NO EXTRACTION in mandibular dental arch	Occipital force on maxillary dental arch Intermaxillary force may be used

* TYPE I forward divergent
TYPE II backward divergent

Fig. 8.—Summary of treatment.

The discussion so far of prepared mandibular anchorage involving extraction may be summed up (Fig. 8) as follows:

(1) In bimaxillary protrusion cases the extraction of four first premolars enables the operator to attain his objectives of treatment. The extraction makes a rearrangement of the remaining teeth possible. The anterior teeth are retracted and the maxillary and mandibuliar posterior teeth are moved forward. The corrected arch relationship is the result of a relative forward movement of the mandibular dental arch. In patients with Type II facial profiles, this forward movement of the mandibular anterior teeth is undesirable.

(2) In well-defined maxillary protrusions and structural mandibular retrusions, treatment by extracting four first premolars and the use of intermaxillary force invites failure.

(3) From the prognostic standpoint it may be stated that because of the limitations to forward movement of the mandibular anterior teeth, the prog-

nosis is uncertain if intermaxillary force is used for the correction of the arch malrelationship in bimaxillary protrusion cases with Type II or backward divergent faces, maxillary protrusions, and structural mandibular retrusions.

SUMMARY

This paper has dealt with a differential diagnosis and an analysis of mandibular anchorage in the treatment of Class II, Division 1.

With respect to the dentofacial relationship present, Class II, Division 1 was divided into five types: (a) maxillary protrusions; (b) bimaxillary protrusions; (c) structural mandibular retrusions; (d) functional mandibular retrusions; (e) retrusions of the mandibular dental arch.

The resistance of the mandible to enforced change does not permit intermaxillary force to change its growth pattern, size, or position in the manner desired.

Since many cases of structural mandibular retrusion are the result of a backward divergent face, it is of utmost importance to differentiate between two types of facial profiles: Type I (forward divergent) and Type II (backward divergent).

The resistance of the mandible to enforced change, the Type II or backward divergent face, and the factors that make for the stability of the treated denture place limitations upon the forward movement of the mandibular teeth in treatment.

Because of these limitations to forward movement of the mandibular teeth in treatment, the anteroposterior malrelationship of the dental arches in maxillary protrusions and structural mandibular retrusions must be corrected by a posterior movement of the maxillary dental arch.

Evidence was presented to show that with few exceptions neither mandibular anchorage nor "prepared" mandibular anchorage without extraction can sufficiently resist the pull of intermaxillary force to effect a posterior movement of the maxillary dental arch without the forward movement of the mandibular teeth.

The extraction of four first premolars and Tweed mechanics appears currently to be the best treatment for bimaxillary protrusion cases in patients with Type I or forward divergent faces.

The extraction of mandibular teeth in an otherwise regular dental arch in maxillary protrusions and structural mandibular retrusions complicates treatment and invites failure.

In conclusion, the use of intermaxillary force for the correction of the anteroposterior malrelationship of the dental arches in the treatment of Class II, Division 1 must be limited to the few cases in which the forward movement of the mandibular dental arch is permissible. In the absence of a standard that would identify these cases with precision, the indiscriminate use of intermaxillary force in the treatment of Class II, Division 1 makes the prognosis doubtful.

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2 EAST 54TH STREET.

POSTWAR PROGRESS IN EVERYDAY CLINICAL PHOTOGRAPHY

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THE constantly increasing use of photography by a growing number of dentists in their various fields is evidence of the definite place photography has in dentistry. Taken routinely, photographs are of value in many ways, such as diagnosis, clinical records, record of changes in the facial line during treatment, reference of patients, presentation of papers and case reports in professional journals and scientific exhibits, improvement in technical and therapeutic results by study of previous results in similar cases, and in practice building through education of the prospective patient or parent. When used for the last, they can reduce tremendously the amount of time spent in consultations. Added to these is the record of the degree of health of both the hard and soft tissues when the photographs are taken in color.

Unfortunately, however, the taking of photographs as a routine procedure has not been practiced by the majority of dentists. This is doubtless due to the natural inertia against adopting a new and additional step in a technique that may already seem too long. Also, it is next to impossible to convince an experienced operator of the value of photographs. Let him find it out for himself and he becomes at once a complete believer. Moreover, there is a general impression that it requires an expert to obtain satisfactory results. The experience of dentists who have made a camera a regular item of equipment disproves these fears.

While it is true that the taking of dental photographs can hardly be classed with amateur snap shooting, the difference does not arise from difficulties inherent in the procedure. Rather, it is because of the fact that the pictures required are of another type, and that the work must be done with all possible dispatch and assurance of success. Most dental photographs are what are known as extreme close-ups, and, to one accustomed to operating an amateur roll film camera, it might appear that they would be complicated to make. However, it will be found that what seem to be problems will readily solve themselves with but a little consideration of a few simple details.

First of all, from the great variety of equipment that is available, items should be selected that are particularly suited to the special requirements of dental photography. Inadequate or poorly designed apparatus will involve an excessive expenditure of time in taking pictures and will produce inferior results. On the other hand, proper equipment will automatically answer the greatest percentage of questions that may be restraining the average dentist from taking advantage of the photography with which he is already familiar.

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Secondly, the photographic procedure should be so standardized that the apparatus can be positioned quickly, with reasonable assurance of consistently good results. This may necessitate some thought and planning, but in each instance it will be found that this simplification will pay ample dividends both in time saved and better pictures. They should be standardized as to size, position, and lighting, and those in color should portray as nearly as possible the true color of the tissues.

The majority of offices are not extensive enough to include a separate photographic room. Sometimes it is possible to convert a large closet into this type of convenience. This is especially suitable, as the light problem is completely controlled. If the room or closet is large enough, the radiographic work may be accomplished in the same space. Any apparatus used to standardize the orientation of the head for photographs may also be readily utilized for the profile radiographs. There are, however, many possible arrangements for smaller offices, wherein the photographs can be taken at the regular dental chair, such as those wherein an attachment to the camera stand relates the patient's head to the camera. Or it may be possible to use the apparatus which I shall illustrate later, attached to a near-by back or side wall, with set positions for the camera in relation to it.

FACIAL PHOTOGRAPHY

Photography of the entire face and the facial profile has specific value to two of the important specialties of modern dentistry, namely, orthodontics and prosthodontics. We will be concerned here with the former.

Several requirements must be kept in mind when establishing a routine procedure for photography of the face. In the first place, it is necessary that the views portray the features without distortion. This means that it must be possible to place the camera at an adequate distance from the subject, and the lens must have sufficient focal length. Secondly, it should be possible to duplicate the procedure whenever desired. Only such technique will assure in each case a series of photographs that will provide an accurate comparison of the conditions at various intervals and permit study of relationships between different cases. Finally, it should be possible to make the exposures in a simple, easy manner, with the minimum disturbance of the usual activities of the office. The procedures that are described in this paper were designed particularly to meet these requirements.

Cameras, especially cameras of high grade suitable for use by the advanced amateur, are usually given careful handling by their owners. This makes it advisable to investigate the secondhand market before making a purchase of an instrument in the medium-priced or expensive classes. Sometimes it is possible to make a selection from the new stock and then obtain a near duplicate in a slightly worn condition, yet just as efficient for picture making, at a much-reduced price. It is advised that, no matter what camera is selected, and whether it be from the new or used lines, one should try the camera first by actually taking pictures with it. There are many minor defects which would not be noticed upon examination.

THE LENS

Since the lens is the heart of the camera, we will discuss that first. Photography is based very largely upon the science of optics. Now, of course, no lens has yet been made which is perfect; but what of it? The wheels of your automobile are only approximately round—they are really polygons of a finite number of sides; and even then the approximate circle is flat on one side, yet this does not trouble you in driving. Your clock or watch keeps only approximate time, in fact, it is comparatively far less perfect than the lens; but you get to work on time. The important question is not "Is it perfect?" but "Does it do the job?" Certainly, in the case of most modern lenses we can answer with an emphatic, "Yes."

The focal length of a lens is determined by the size of the image which it forms. An object of known size produces an image which is carefully measured. A simple lens is now substituted for the lens under test, and one is found which gives exactly the same-sized image. The true optical focal length of this simple lens is known, and this focal length is assigned to the lens under test regardless of its true measurement.

The focal length of any photographic lens is the focal length of a simple lens which will produce an image of the same size. It is an equivalent focal length.

SPEED OF LENS

The speed of the lens is determined by dividing the focal length by the diameter of the maximum aperture, which as far as many of you are concerned is excess verbiage. All you have to know is that a fast lens requires less light to reach it to take a picture, but few amateurs realize that when they buy fast lenses they are sacrificing some quality for speed. When the high-speed lens is stopped down to correspond with the speed of a slower and therefore much cheaper lens of corresponding quality, the faster lens will be the less desirable of the two. This comes about because the design of any lens must be a compromise between its maximum speed or aperture and correction of the various defects or aberrations; it is impossible to correct fully (at any aperture) any high-speed (large-aperture) lens. Lenses with the precise corrections giving critically sharp definition over the whole negative are necessarily designed to work at small apertures. It being necessary to stop the lens down to at least f:8 to obtain approximately the two-inch depth of field necessary for a good intraoral picture, it is a waste of money to buy a fast lens.

It is a known fact that very often when working on the verge of underexposure, a cheap box camera will give a more fully exposed negative than will an expensive camera whose fast lens has been stopped down to the same aperture as the cheap camera. This is attributed to a wrong aperture marked on the cheap lens, but the sad fact is that although we are repeatedly told that the exposure at any given aperture is the same for all lenses, this is not true. Under all ordinary conditions, at equal apertures a simple box camera lens is faster than a high-speed lens.

However, the costly lens still has other advantages of superior correction and freedom from faults, due to the construction of the high-quality lens. When light strikes any glass surface, a part of that light, usually a minimum of 6 to 8 per cent, is reflected and does not enter the lens at all. At the opposed surface this again takes place, so that with any normal lens, considerably less than 90 per cent of the original (incident) light passes clear through it. Most fine lenses have several elements separated by air spaces, and, of course, all of them have at least two elements. That means four reflecting surfaces or more. As a result, good lenses rarely pass 80 per cent of the light, and very many of them manage to suppress 50 per cent. A modern high-speed lens which passes 60 per cent of the original light may be considered as having satisfactory efficiency. The new "coated" lenses do much better than this because the low individual losses at each surface produce a much lower cumulative loss.

However, even at 50 per cent the loss is equal only to one stop even when compared with no lens at all, so it can be seen that the exposure factor is not seriously affected.

COVERAGE

The lens projects light into the camera in the shape of a cone rather than a pyramid. If the camera were large enough, this light would fall upon the rear wall of the camera as a more or less clearly defined circle, while the image would be seen to be of very poor quality near the edges of the circle. In practice, the camera is made so that its bellows cut into the sides of the cone, and in the rear of the camera a metal or other opaque shield is used to cover all the film except the normal "frame" size. Thus a normal lens for a 35 mm. camera will project a circular image three inches or so in diameter, but all that is used is the 24 by 36 mm. area right in the center of the circle. The covering power of the lens refers to the relative sizes between this circle and the used area. For example, a three-inch diameter circle used for a 2¼″ by 3¼″ film size would not reach the corners, and all along the edges there would be areas of poor definition. Thus the small lens will not "cover" the 2¼″ by 3¼″ film.

Normal lenses usually have a circle diameter roughly twice the diagonal of the film used. This is not a fixed rule, however. Some special lenses have only about 50 per cent excess, while others have circles with diameters three times the diagonal or even more. It is desirable to have the circle as small as possible in relation to the used area, as this keeps stray light out of the camera.

It is obvious that the light which forms that part of the image not used in making the negative must reflect and re-reflect inside the camera and, despite the black lining, a certain amount of this must eventually reach the face of the film, causing "fog." This is true. To prevent it, lens hoods are often used outside the lens to cut down the circle, and the best of these hoods have masks inside the camera. The absence of fog on negatives made in this way causes the negatives to have increased contrast—hence the saying that a lens hood will add brilliance to your negative. It does no such thing. It only keeps out the light which would fog the film and in this way obscure the natural brilliance of the negative, but it amounts to the same thing. The only reason for the

quibble is that we should learn to think straight and to couple results with their true causes and not get into the habit of saying "A is here" when we really mean "B is absent."

DEPTH OF FIELD

The depth of the field is the distance from the nearest point to the farthest point of the subject being photographed, over which the lens will render sharp definition. Stopping down the lens increases the depth; that is, the smaller the lens opening, the more likely your picture is to be sharp all over.

There is nothing we can do about the depth of field. This is a fixed property of a lens determined by its focal length and aperture. As a consequence, all lenses of the same focal length will have the same depth of field at a given aperture and working distance, irrespective of their optical design.

The only solution is to work at a small aperture. One of the great problems of close-ups of the type we are doing is that of getting sufficient depth of field, and the only solution is the use of small apertures. Some things have never been satisfactorily photographed because of this very difficulty. It seems that the laws of optics are against us in this case.

This means that in medical and dental photography where motion of the subject is a frequent cause for lack of sharpness, we are forced to use illumination of sufficient intensity to permit the use of a small lens aperture together with an exposure time short enough to eliminate lack of sharpness due to motion. This means that in many cases we have to resort to flash lamps because the intensity which would be required if flood lamps were used would be so great that the subject would be affected.

COLOR

Aside from the cost involved in the use of color prints for publication, there is no comparison in the value of color over black and white. Color reproductions are not only more lifelike and give a much more true picture of the part under consideration, but they serve as an excellent record of the health of both the hard and soft tissues before, during, and after treatment. Many a parent has not noticed an opaque area in the enamel of an anterior tooth until after the appliances have been in position for a while. To be able to produce a photograph in color taken before treatment was started can be a great comfort to both the operator and the parent.

LIST OF DESIRABLE QUALITIES

The problem, therefore, resolves down to a camera possessing the following qualifications:

1. A good slow lens, such as the Goerz, Zeiss, Cooke, Bausch and Lomb, or Kodak makes, of f:6.3 or f:6.8 or even the Kodak Anastigmat f:7.7, if one can be obtained with a good shutter. It may be difficult under present conditions to get one slower than an f:4.5 in a good camera.

2. The lens must have a focal length of at least four inches to eliminate the greatest amount of distortion.

3. Interchangeable lenses, extension tubes, or a double extension bellows to permit the change of distance from full head to intraoral pictures.

4. Ground glass focusing, preferably reflex, for standardization.

5. Adaptability to the use of Anscocolor or Kodachrome in 135A (35 mm.) or 828A (Bantam) sizes. The former is cheaper but I prefer the latter for full heads as there are only eight pictures to a roll and it is, therefore, more quickly finished, processed, and returned to permit retakes, if necessary, before treatment is started.

6. Construction permitting the use of a stereoscopic attachment. There is nothing comparable to a stereoscopic picture in color.

7. Convenience and facility of operation.

Unfortunately there is not, as far as I can determine, a camera made which incorporates all of these attributes.

PLATE AND FILM PACK CAMERAS

Actually view cameras, this type is the most efficient equipment to be had. Being adapted to plates, cut films, and film packs makes available a wide variety of emulsions of various speeds and color responses.

Many and varied are the uses of the long extension bellows provided with these cameras. Besides permitting extreme close-ups without distortion, they are also adapted to the copying of pictures, drawings, photographs or other objects, at full size or even somewhat enlarged. When attached to a simply constructed instrument, this type of camera can be used as an efficient enlarger or projection lantern.

The principal disadvantage is the possibility of movement of either the subject or the camera after the focusing and before the actual snapping of the picture. The shutter speed and aperture have to be set, the shutter cocked, and the film put into place.

SINGLE-LENS REFLEX CAMERAS

A single-lens reflex camera consists essentially of a box containing a single lens, an inclined mirror between lens and film plane, and a horizontal ground glass. The single-lens reflex differs from the view camera in that the film remains in the camera while focusing because the inclined mirror reflects the image away from the film to the ground glass. Naturally, the mirror is automatically removed from the path of the image on its way to the film just before the shutter opens when the picture is snapped. The photographer sees the image right side up and full size on the horizontal ground glass by looking down into a hood.

DOUBLE-LENS REFLEX CAMERAS

The double-lens reflex resembles the single-lens reflex in that by looking into the hood of the camera you see the image right side up and full size on a horizontal ground glass. However, the double-lens reflex is provided with two lenses, one for taking the picture and one for viewing the image on the ground glass. The viewing lens has an unadjustable aperture as large or even larger than the largest aperture on the taking lens. Therefore, the image on the

ground glass is always at its brightest, even though the taking lens may be set at a small aperture for the proper exposure. The image can also be observed before, during, and after the exposure.

Fig. 1.

Fig. 2.

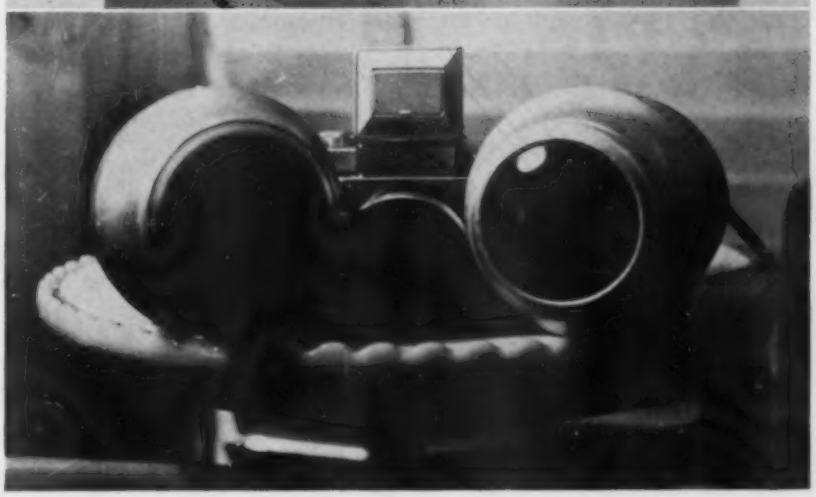


Fig. 1.—Praktiflex camera. Miniature, single lens, reflex type.
Fig. 2.—Praktiflex on tray with extension tube, lens hood, and two bullet spots.

The double-lens reflex lacks one of the advantages of the single-lens reflex in that with it it is not possible to judge the depth of field on the ground glass. In the case of the single-lens reflex, you can open or close the diaphragm of the lens and observe the depth of field on the ground glass at any particular lens aperture. It is impossible to do this with the viewing lens of the double-lens reflex because of its unadjustable aperture. Double-lens reflex cameras have another disadvantage not encountered in the single-lens reflex in that parallax error becomes an important problem to be considered at close distances. Despite the proximity of the two lenses, the viewing lens and the taking lens do not "see" exactly the same thing.

MINIATURE CAMERAS

Miniature cameras and larger cameras each have their advantages and disadvantages. The short focal length lenses of the Leica type miniature, usually 50 mm. or about two inches, give great depth of field, thereby making focusing at short distances less difficult. However, the distortion is relative to the depth of focus, and any experienced eye can spot a close-up taken with a two-inch lens, due to the "pulled out" or magnified appearance of the part of the field nearest the lens. The 35 mm. film is, however, the most economical, especially in color, and excellent results of localized areas in the mouth can be obtained by means of a Speed-O-Copy or ground glass attachment for this type of camera.

THE TWO I USE

I shall now describe examples of two of the aforementioned types which "fill the bill" if used in conjunction.

Fig. 3.

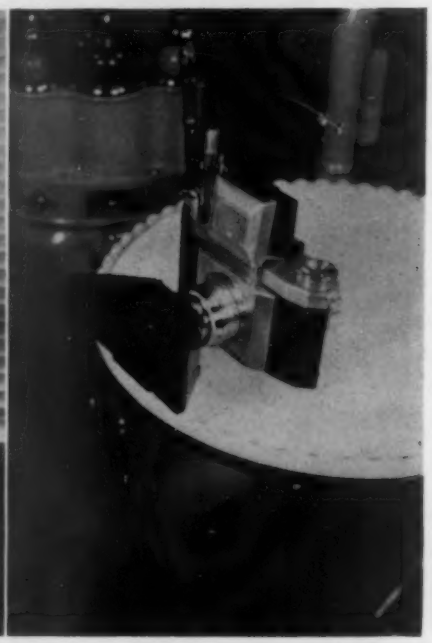


Fig. 4.

Fig. 3.—In position for full-face oral picture.

Fig. 4.—Special Stereo-tach in position on lens mounted in 10 mm. extension tube for intraoral photographs at thirteen inches.

PRAKTIFLEX

First, let me list the advantages and disadvantages of a fairly reasonably priced miniature camera, the Praktiflex. This is, unfortunately, a foreign-made camera, but it embodies many of the previously listed qualities at a cost now of about $70 secondhand, with an f:3.5 lens. It was $65 new before the war with an f:2.8 lens and is now $105.

Like all miniatures, it has a focal length of only 50 mm., and it is constructed to receive interchangeable lenses and extension tubes, thereby permitting clean-cut close-ups but, of course, with serious distortion to the trained eye if used for full-head photos.

However, it differs from most miniatures in that it is a single-lens reflex camera with focal plane shutter and ground glass focusing and, therefore, requires no Speed-O-Copy attachment for that purpose. It also takes 35 mm. film which is the cheapest Anscocolor or Kodachrome film on the market. Thirty-five millimeter Kodachrome is cut to take twenty pictures but can be pushed to include twenty-two with careful darkroom loading, at a cost of eighteen cents per picture.

This camera is simple to operate with flood or flash. I prefer the former. Merely lay two No. 1 Photoflood bulbs in bullet spots on the bracket tray, on either side of the camera.

If the arm has a joint at a point to let it fold back on itself and permit the bracket table to swing toward the patient so that with the camera on the tray it measures ten inches from the canines to the film, close-up intraorals may be taken by the use of a 10 mm. extension tube. Floodlights are preferable for the close-ups as flash bulbs have been known to explode.

This camera is perfectly adapted to stereoscopic work, by means of a push-on adapter ring, and it is also mechanized to eliminate blanks or double exposures.

RECOMAR

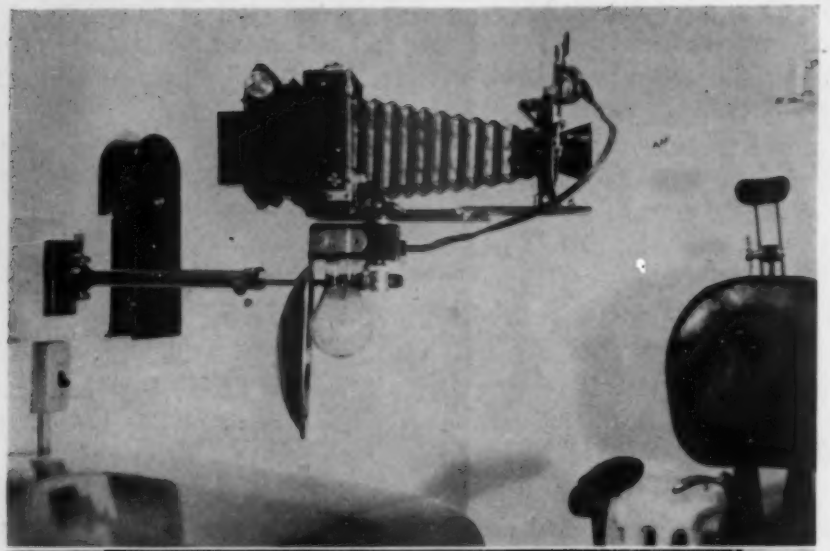
The second camera that I shall describe is a Kodak Recomar, either the No. 18 (Fig. 5), costing under $60 secondhand today, or the larger No. 33, fitted with a Kodachrome adapter, either 135 or 828. In the No. 18, 6 by 9 cm., or 2¼″ by 3¼″, the color film is vertical, and in the No. 33, 9 by 12 cm., or 3½″ by 5″, it is horizontal. These cameras are equipped with f:4.5 or slower lenses with a focal length of 105 mm. (four inches) and double extension bellows, thereby eliminating distortion. (Fig. 6.)

They are really view cameras since, although the focusing is done on ground glass, they are not reflex. Therefore, the camera must be firmly fixed as it is necessary to set the speed and aperture, cock the shutter, and move the film into position after focusing before the picture can be snapped.

Here again flood or flash may be used for the exposure. I prefer flash as it permits a much more normal expression on the patient's face. However, the same bullet spots may be used, for, as the distance from the patient is greater, so also is the area of coverage increased. (Figs. 7 and 8.)

If the camera is to be set on, the bracket tray, it can be accurately located after focusing by fixing the tray against rotation and outlining the camera with a pencil on the paper tray cover. Should any movement of the camera occur while setting the speed and aperture, it can readily be returned to its original position on the marking. A measurement may be taken from the ground glass to the nasion to standardize the distance, or a set focus may be used and the bracket arm merely located so as to bring the lens into focus.

Fig. 5.



A. B.

Fig. 6.

Fig. 5.—Recomar No. 18 with synchronizer and flash mounted in vertical on bracket arm.

Fig. 6—Picture taken on black and white film of two Kodachrome transparencies mounted on a viewbox. *A*, Taken with camera with four-inch focal length. *B*, with camera with two-inch focal length, the latter showing definite distortion.

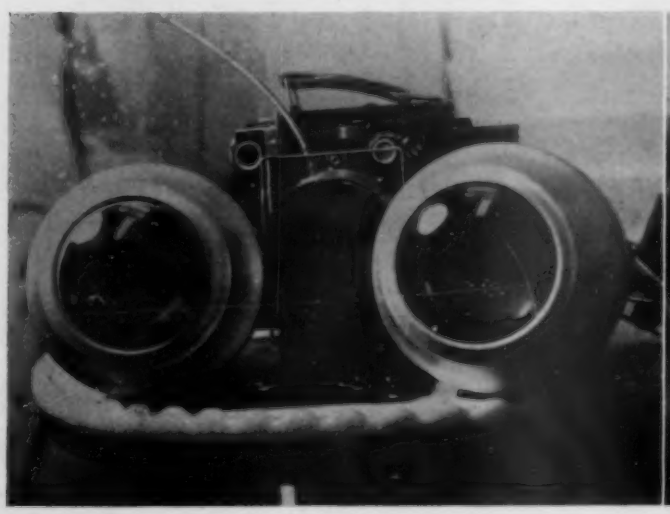


Fig. 7.

Fig. 8.

X-RAY AND PHOTOGRAPHIC ROOM

My suite of offices is blessed with a windowless room which had been, before my occupancy, a large closet. By using an old dental chair with the footrest removed, it serves as an ideal photographic and x-ray room, as well as a fourth chair in a pinch.

The cameras slip into a bracket which locks at a certain position and is directly related to a device* located on the wall behind the chair which orientates the head in relation to the camera. The Frankfort plane corresponds with the horizontal line on the ground glass, and the vertical line passes through the nasion for the full face (Fig. 9).

Fig. 9.—Head holder in position with Kodachrome adapter attached to Recomar camera in a vertical position, with ground glass in place for focusing

The vertical line passes through the outer canthus for the profile (Fig. 10). The nasion is the pivotal point.

We focus on some printing held at the outer canthus for the full face and in front of the right eye for the profile.

When all is in position, the assistant maintains the position of the patient by holding the device tightly against the orbitale while the operator sets the diaphragm aperture and shutter speed, cocks the shutter, and moves the film into position (Fig. 11).

The assistant then quickly folds the head device back against the wall and pulls down the black shade, which prevents background shadows and sets off the face. The picture is immediately snapped. (Figs. 12 and 13.)

I take the full-head pictures with the No. 18 Recomar at thirty-nine inches from the vertical 828A Kodachrome film in the adapter, to the nasion. The

*Head positioning part of the Carey Photo-Gnathostat.

Fig. 10.

Fig. 11.

Fig. 10.—Head holder in position for profile with Kodachrome adapter attached to Recomar camera in a vertical position, with ground glass in place for focusing. The tragion pointer is on the side away from the camera.

Fig. 11.—Patient's head held in position while shutter and diaphragm are set and film moved into position.

Fig. 12.

Fig. 13.

exposure data is one-fiftieth at f:16 with a No. 16 synchronized flash bulb. This distance and aperture with this camera give a depth of field of nine and three-eighths inches and an image one-eighth scale. However, I now use a Fotolux electronic flash with a General Electric sealed beam flash tube (Figs. 14 and 15) which does away with flash bulbs and shutter cocking entirely. Guaranteed for 10,000 flashes at least, it will repay its $243 cost in my office in two years and should last eleven to twelve years. This flash has a duration of only 1/5,000 of a second and does not bother the children at all. The intensity is enough to permit an exposure at f:9 with a Haze filter on daylight Anscocolor or Kodachrome film. Note that daylight film is used with electronic flash as it has an entirely different color temperature than regular flash or flood. Eastman recommends a CC15 filter or a Wrattan 2A, but I find a regular Haze filter to be superior in my office.

Fig. 14.

Fig. 15.

In a dimly lighted office, the exposure can readily be accomplished with a bulb setting, as color film is so slow that there is no effect on the film during the short time the shutter is open before and after the 1/5,000 of a second exposure. For about $40 it can be synchronized, which simplifies procedure.

INTRAORALS WITH THE RECOMAR

The intraorals may also be taken at eighteen and one-half inches from horizontal 828A Kodachrome film to the canines. The exposure is at one second at f:22, which gives a depth of field of about two inches. At this distance and aperture the area included is two inches by three inches and the scale one-half actual size.

STANDARDIZATION FOR DUPLICATION

To prove to myself what degree of duplication of positioning I was achieving, I exposed a patient twice on the same film. After the first exposure, the child left the photographic room, the camera and head holder were folded back against their respective walls and the chair lowered—routine procedure except

Fig. 16—Regular full facial of patient compared with double exposure of same patient for determining degree of standardization.

Fig. 17.

Fig. 18.

that the film was not changed. We then started all over again and took a second picture on the same film. (Fig. 16.) The result is not perfect, but close enough to render a true comparison of facial line. Of course, the film is overexposed, having been twice "flashed," and the child's clothing has shifted position.

Fig. 19.

Fig. 20.

Fig. 21.

In my office this head holder also serves to obtain a degree of standardization in the taking of profile roentgenograms (Figs. 17 and 18). All cameras should be equipped with cable trip to prevent any movement when snapping the picture.

For the oral photos, the single-lens reflex camera is mounted on an old bracket arm with the bullet spots on either side. This is swung out into position with the chair rotated to face the camera. Cheek retractors may be held by the patient or the assistant. We take whatever pictures are necessary to show the original condition but never more than four, usually a profile oral, right oral to show the molar relation on the right side, full face oral, and left oral (Figs. 19, 20, and 21).

After the appliances have been placed we take palate and lower lingual views to complete the picture and record the appliances (Figs. 22 and 23).

Fig. 22.

Fig. 23.

The entire original six photos, two full heads and four orals, are routinely taken in my office in about ten minutes, at a film and processing cost of $1.12.

FILING AND VIEWING

Cases are mounted in Filmdex mounts and filed in an ordinary filing cabinet with ten-inch by twelve-inch drawers. If there is not time to project them on the screen, they may readily be viewed on any x-ray view box, preferably with fluorescent lighting (Fig. 24). The new Filmdex strips accommodate six slides and are a convenience in viewing at the chair or in projecting (Figs. 25 and 26).

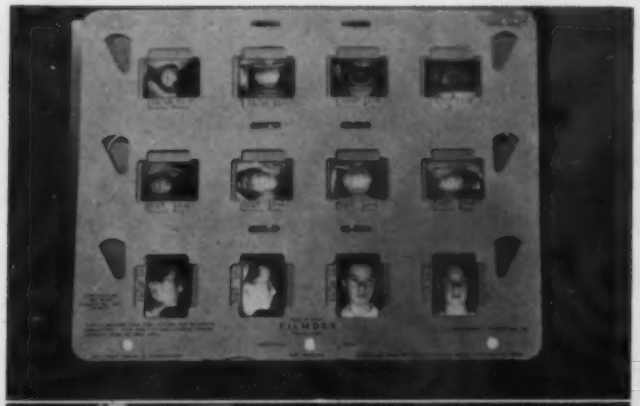


Fig. 24.

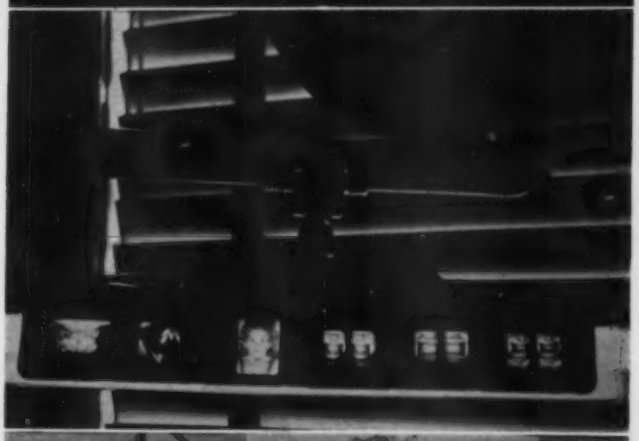


Fig. 25.

Fig. 26.

Fig. 24.—Twelve pictures of a case mounted for convenience in filing or viewing.
Fig. 26.—Mounting strips for filing, viewing, and projecting.

LIGHTING

The characteristics and general application of the most suitable light sources for dental photography are presented in this article in order to provide basic data from which a practical understanding of illumination may be readily acquired.

The objective in the making of every dental photograph should be to record all detail in the area of interest with utmost sharpness. From the standpoint of illumination, this requires the provision of light of sufficient intensity to permit, first, an exposure time short enough to preclude movement of the subject during the exposure and, second, use of a lens aperture (diaphragm opening) small enough to obtain adequate depth of field (over-all sharpness) in the area of interest.

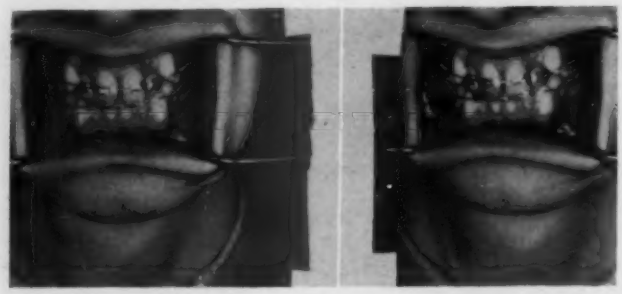


Fig. 27.—Opaque stereoscopic for viewing in a stereoscope.

Fig. 28.—Kodachrome stereo projected on a silver screen and viewed through vertically polarized lenses.

The foregoing general considerations are based on the quantity of illumination, and they apply whether the film used is black and white, from which prints will be made, or full color, which will be viewed as a transparency or projected to provide a screen image.

In full-color photography, the quality of the illumination must be considered also. But cooperation of the manufacturers of lamps and the film has precluded complications for the photographer.

Lamps and the film are accurately rated as to color temperature, which is expressed in degrees Kelvin. Each type of lamp is listed at so many degrees Kelvin, and this figure immediately indicates the color temperature of the light emitted. Each type of film is specifically balanced for a color temperature of so many degrees Kelvin, which immediately indicates the temperature of the light source that must be used for its exposure. All the photographer has to do is make certain that the light source is of the correct color temperature for the type of film he wants to use. This is essential, however, because a light source of a color temperature that is too high for the type of film employed will cause the picture to be excessively blue, while a light source of a color temperature that is too low will cause the picture to be excessively red.

A major precaution is to avoid a mixture of light from sources of different color temperatures. If this is not done, the colors in the photograph will be off balance, even though one of the sources may have been of the correct color temperature. For this reason, it is advisable to exclude all daylight from the room when artificial illumination is employed. In situations where this is inconvenient, there is the alternative of using daylight from the office windows and light from daylight type Photoflood lamps. The difficulty in such procedure is to establish a standardized technique, since the color temperature and the amount of daylight vary greatly with the season, the time of day, and the weather conditions prevailing. Therefore, a method employing artificial illumination with the exclusion of daylight should first be considered.

A point of interest here is that in some cases where the light source is not of the correct color temperature for the film it is desirable to use, compensation may be accomplished by placing over the camera lens a filter specifically recommended for the purpose by the manufacturer of the film. A filter used in this manner may be said to have the photographic effect of raising or lowering the color temperature of the light source.

When the type of illumination is decided upon, it is important that proper reflectors for the lamps be used. Those that have inner surfaces of a highly polished white metal are advisable because even a trace of color would affect the color balance of the photograph.

I will not have time to go into stereoscopy, which is an entire study in itself. However, if you will endeavor to look at the right picture with your right eye and the left picture with your left eye, there will be some among you who will be able to see in stereo without any viewing apparatus. (Figs. 27 and 28.)

THE VALUE OF PREDETERMINED ARCH DIMENSIONS AND FORM "SETUPS" AS A DIAGNOSTIC AID IN ORTHODONTIC TREATMENT PLANNING AND POST-TREATMENT MAINTENANCE

HOWARD YOST, D.D.S., GRAND ISLAND, NEB.

SYNOPSIS

This report includes both nonextraction and extraction cases, and provides a means for predetermining whether extractions are necessary before treatment is started.

INTRODUCTION

In an attempt to prove my contention, I will give four illustrated case reports. Two of these patients, both nonextraction, have completed the primary stage of treatment and are now under post-treatment maintenance. The other two are in the process of treatment. Of the latter, one is a nonextraction case and in the other extraction was indicated. In both of these cases, predetermined arch dimension and form "setups" have been made to determine whether extraction was or was not indicated as an aid to treatment planning.

CASE REPORTS

CASE 728.—L. C., female, aged 13.

Classification.—Apparent distoclusion, bilateral (Class II, Division 2).

Differential Diagnosis (Simon).—

Maxilla:

A. Contraction
   Lateral dentoalveolar, medium degree, symmetrical.

B. Protraction
   Lateral dentoalveolar, medium degree, symmetrical.

C. Abstraction
   Incisal, extreme degree, symmetrical.

Mandible:

A. Contraction
   Total dentoalveolar, extreme degree, symmetrical.

B. Retraction
   Dentoalveolar, medium degree, symmetrical.

C. Attraction
   Total mandibular, extreme degree, symmetrical.

Presented at the meeting of the Central Section of the American Association of Orthodontists, Minneapolis, Minn., April 14, 1947.

The patient was an identical twin with slight deviation of identical anomalies. Both parents had abnormal occlusions and irregular alignment of arch form. The patient had always enjoyed good health with a healthy mucosa and a mild incidence of caries. The tongue was normal in size; the tonsils and adenoids had been removed at an early age. Nose, lips, and breathing were normal. The facial muscles were of normal tone.

Etiology.—There was, perhaps, a prenatal influence of intrauterine pressure and a hereditary influence.

Therapy.—

A. Maxilla: Twin arch labial mechanism, Bds 6 2 1 | 1 2 6 and lingual arch with lateral auxiliary springs.

B. Mandible: Lingual arch with lateral auxiliary springs for arch form and later supplemented with round 0.018 labial arch with Bds 6 3 2 1 | 1 2 3 6

C. Intermaxillary rubber dam elastics were prescribed for a period of eleven months following development of maxillary and mandibular arch form.

Fig. 1.—Case 728. Gnathophotostats before and after treatment.

Progress of Treatment.—This case was treated over a period of twenty-eight months at intervals of four weeks. Inasmuch as considerable change of alveolar bone substance was necessary, as well as tooth positioning within the alveolar substance, no attempt was made to hurry treatment. Following removal of all mechanisms from the teeth, a Kesling rubber positioner type retainer was made to improve further the esthetic appearance of the teeth for a more pleasing arrangement.

Summary.—I definitely feel this was not a case where extraction of dental units was indicated. The over-all facial and cranial dimension, together with the general physical stature, seemed to indicate that further dimensional development of the supporting structures of the dental mechanism was indicated. It is my opinion that extraction in this case would have created a disfiguring edentulous facial appearance for this patient.

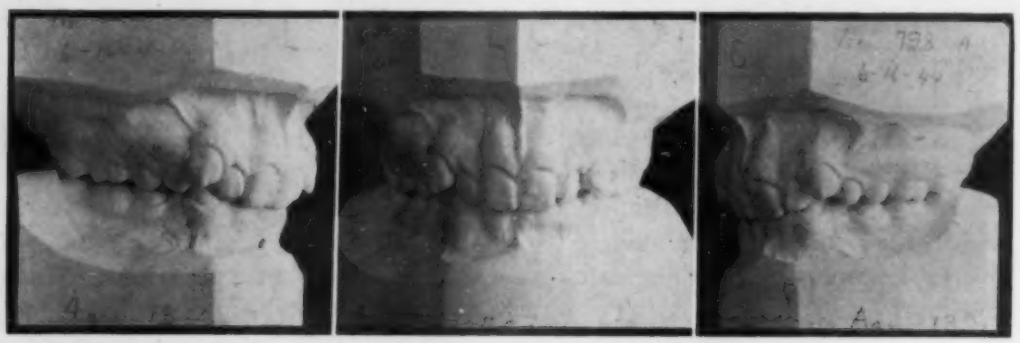


Fig. 2.—Case 728. Gnathostatic casts before treatment.

Fig. 3.—Case 728. Gnathostatic casts after treatment.

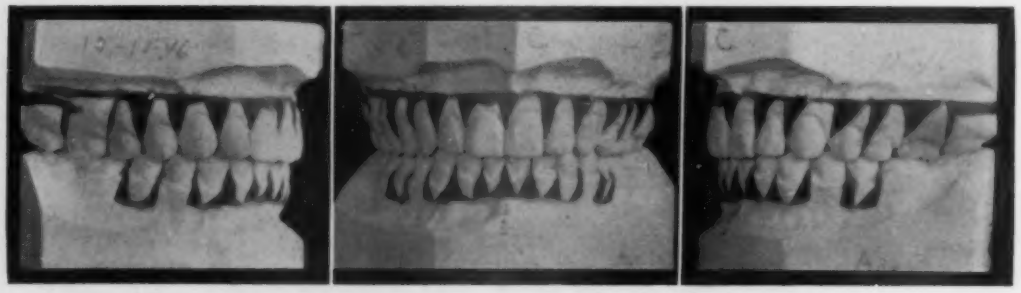


Fig. 4.—Case 728. Post-treatment casts as prepared for positioner.

Case 654.—D. J. W., female, aged 8.

Classification.—Apparent distoclusion, bilateral, Class II, Division 1.

Differential Diagnosis (Simon).—

A.

1. Maxilla:

Contraction, lateral incisal, mild degree, symmetrical.

2. Mandible.
   Contraction, lateral, mild degree, symmetrical.

B.

1. Maxilla:
   Protraction, total, extreme degree, symmetrical.
2. Mandible:
   Retraction, total, mild degree, symmetrical.

C.

1. Maxilla:
   Abstraction, incisal, mild degree, symmetrical.
2. Mandible:
   Attraction, incisal, mild degree symmetrical.

History and Observations.—The father, a comparatively young man, was wearing artificial dentures. The mother's teeth were quite irregular. Oral examination revealed a healthy mucosa and gingivae with an extensive amount of caries of deciduous teeth. X-ray showed the total number of permanent teeth; the tongue was of normal size; the tonsils were absent at the age of 6 years; the general health was only fair, with repeated colds and nasal obstructions; the lips were in malrelation due to prolonged and habitual mouth breathing. The parents were advised to have the nasal passages and throat re-examined and, if there were no obstructions or pathology, treatment would be started.

Therapy.—Appliances were placed in August, 1943.

A. Maxillary bands were placed on 6 1 | 1 6 with 0.036 horizontal tubes on the molar bands and 0.022 Ketcham type hooks on the incisor bands. The maxillary labial arch consisted of two lateral segment tubes, 0.035, outer diameter, and 0.022, lumen. A 0.022 chrome alloy wire with two 360° loops bent just distal to the lateral incisors and ends extending the entire length of the buccal segment tubes composed the anterior segment. The 360° loops were used as a means of attaching elastics and hooks for occipital anchorage.

B. Mandibular bands were made for 6 | 6 A 0.036 chrome alloy lingual arch was adapted with end soldered to lingual surface of molar bands. Hooks were welded to buccal surface of the molar bands for attaching elastics.

C. The first phase of treatment comprised one year's time, during which the patient wore light elastics cut from dental rubber dam during the daytime and substituted No. 4 elastics at night. These were attached to a headcap by means of hooks engaging the 360° loops in the anterior segment of the labial arch.

Following this, all appliances were removed and a Hawley plate with labial retainer were worn for the next eighteen months. At the end of this period, it appeared that the maxillary denture was in slight protraction, so the bands were recemented and the maxillary labial arch inserted for a secondary period of traction as employed previously. This secondary active treatment period consisted of eleven months, following which all appliances were again removed and another Hawley type retainer with inclined plane to guide the lower incisors in their path of occlusion was worn.

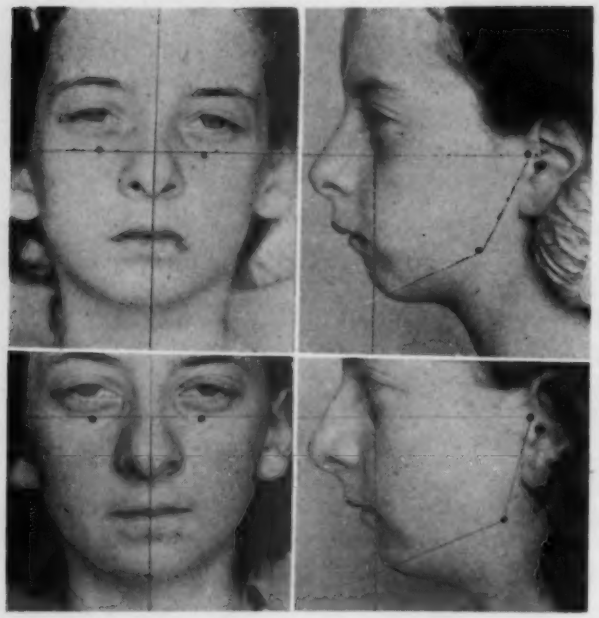


Fig. 5.—Case 654. Gnathophotostats before and after treatment.

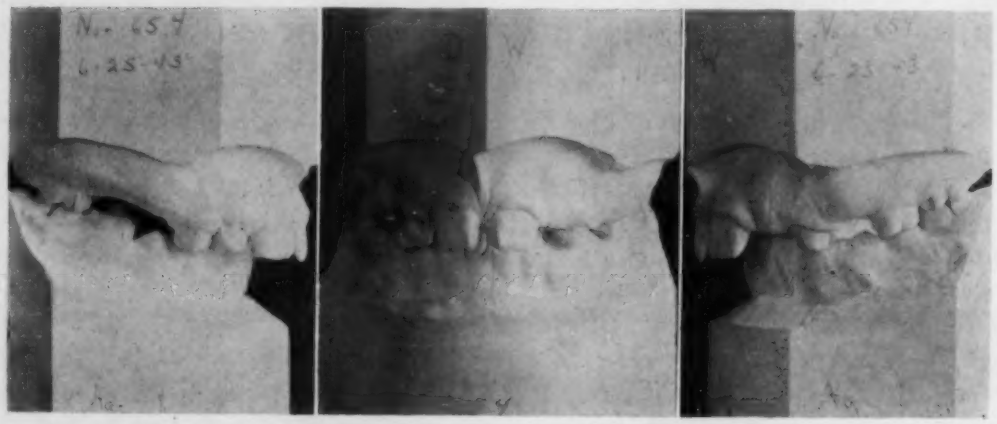


Fig. 6.—Case 654. Gnathostatic casts before treatment.

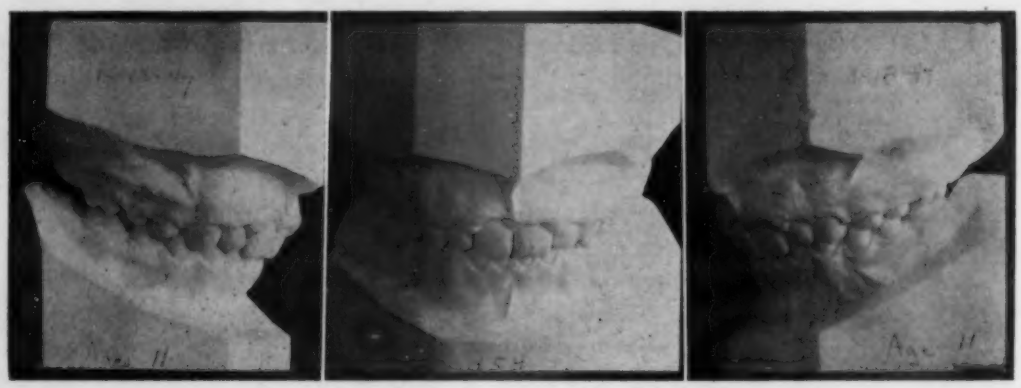


Fig. 7.—Case 654. Gnathostatic casts after treatment.

This case report has not been made to show any extraordinary results or any unusual method of treatment. The case is quite typical of those that orthodontists see almost daily in their offices. The results show both dentures in proper relationship as functional units of the masticatory mechanism. Whether they have been restored to normal position as related to the jaws and facial structures depends entirely upon extrinsic forces that govern the growth and development of these structures. Rather, this case report is given to reiterate our responsibility to these patients of so tender years who have the misfortune of extreme dentofacial deformities. Rather than dismiss these cases until all the permanent dentition has erupted, for the sake of extraction of certain dental units to effect correction, it is my opinion that these cases should be guided toward the direction of normal association of the various components. A chronology of the treatment record indicates a total of twenty-three months of fixed appliance therapy, with an intervening period of eighteen months of a removable functional type of appliance. How long it will be necessary to retain the case in its present stage through augmented retention stimulation is open for speculation.

CASE 921.—H. M., female, aged 12.

Classification.—Class I (Angle) closed bite. Apparent neutroclusion which, in the parlance of some orthodontic groups, might be termed bimaxillary protrusion.

Differential Diagnosis.—

A. Maxilla:
Distraction, lateral segments, mild degree, symmetrical.
Mandible:
Contraction, lateral segments, mild degree, symmetrical.

B. Maxilla:
Protraction, incisal segment, mild degree.
Mandible:
Retraction, incisal, mild degree, symmetrical.

C. Maxilla:
Abstraction, incisal segment, mild degree.
Mandible:
Attraction, incisal segment, mild degree.

History and Observations.—Her parents' teeth were within normal variation, both having slight overbites. Her mother's teeth were slightly separated between the upper central incisors. The patient had a normal mucosa for the age period. There was a mild degree of dental caries; x-ray revealed normal bone structure with all four third molars present in crypts. The lower left cuspid was unerupted, with an anomalous formation either of an additional cusp or a supernumerary tooth. The tongue was slightly enlarged; the tonsils and adenoids were absent. Her general health was good; nose and nares were normal; lips were slightly malrelated and muscles were atonic. She was breathing partially through the mouth, but her nose was not obstructed.

Etiology of Malocclusion.—Possibly pressure habits; partial mouth breathing and posture.

Therapy (Mechanical).—

1. Maxilla: Bands 6 4 3 2 1 | 1 2 3 4 6 with round 0.018 labial arch and snap channel brackets were used. Loop springs were placed anterior to molar buccal tubes for contraction of maxillary arch. Arch wire was placed gingival to incisor brackets.

2. Mandible: Bands 6 3 | 3 6 with soldered lingual arch and lateral auxiliary 0.016 springs for lateral pressure were used. Subsequent to development of arch form, a labial 0.018 round arch will be placed to tip the incisor lingually.

Fig. 8.—Case 921. Gnathophotostat before treatment and gnathograph of casts.

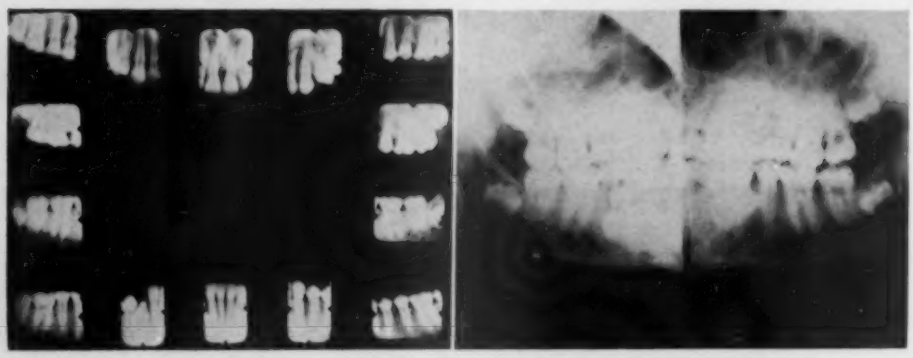


Fig. 9.—Case 921. Pretreatment roentgenograms.

3. Subsequent to the necessary maxillary tooth movement for arch form and alignment, a Hawley maxillary bite plate will be prescribed for vertical movement of all posterior teeth.

4. Retention of this case will be attempted through use of a Hawley retainer or a Kesling type positioner.

Prognosis.—The treatment of this case is comparatively simple, and the prognosis should be good. This case has been shown to illustrate that it is unnecessary to extract in all types of so-called bimaxillary protrusion. After all, where our judgment can be convinced that we may expect a continued growth of bones of the face and jaws, many so-called cases of bimaxillary protrusion develop into esthetically proportioned faces. In this case, the predetermined "setup" clearly indicated the folly of extraction in this type of case.

Fig. 10.—Case 921. Pretreatment gnathostatic casts.

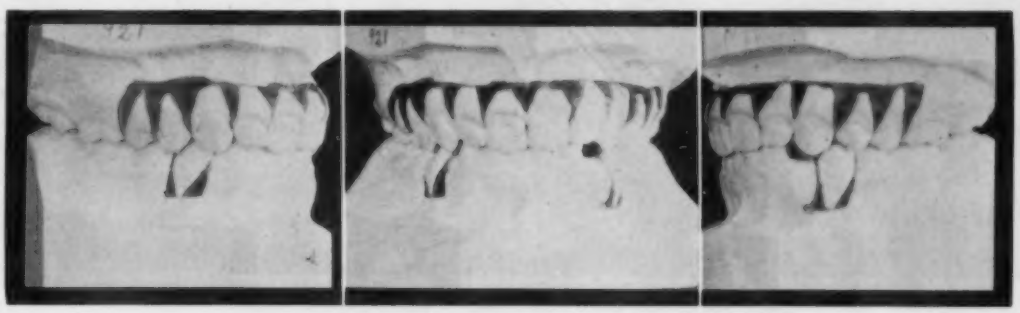


Fig. 11.—Case 921. Predetermined arrangement of twelve dental units of twenty-seven erupted units as a diagnostic aid for treatment.

Case 912.—B. K., female, aged 14.

Classification.—Class II, Division 2. This case might be termed an apparent bilateral distoclusion case with constriction of both jaws, crowding of maxillary cuspids labially, and buckling of mandibular incisors.

Differential Diagnosis.—

Maxillary:

A. Contraction

Lateral and incisal segments, medium degree, symmetrical.

B. Protraction of lateral segments, extreme degree (1 tooth), symmetrical.

Mandible:

A. Contraction

Total mandibular, medium degree, symmetrical.

Fig. 12.—Case 912. Gnathophotostats before treatment.

Fig. 13.—Case 912. Gnathostatic pretreatment casts.

Fig. 14.—Case 912. Predetermined alignment of anterior teeth after removal of the four first premolars. The posterior teeth have not as yet been rearranged. Spaces indicate the amount of distance the posterior teeth must be moved forward after the anterior teeth have been moved back and alignment has been accomplished. Before treatment is completed, the posterior teeth will be arranged for alignment and articulation and positioner made to insert upon removal of the appliances.

History and Observations.—Her father's teeth were normal and her mother's were irregular. The soft tissues were healthy; there was a medium degree of caries. There was a normal number of teeth, with third molars in the process of development in crypts, tongue normal in size and shape, tonsils removed at an early age, general health good, nose and nares normal, lips in protruded occlusion, and facial muscles in normal tone.

Etiology of Malocclusion.—Predisposing causes, maternal heredity. Determining causes, premature loss of deciduous teeth.

Therapy.—

A. Extraction of the four first premolars.

B. Mechanical:

1. Maxilla: Bands 6 5 3 3 5 6 Bilateral contractile springs to move 3 3 distal to spaces of 4 4.

2. Mandible: Bands 6 5 3 3 5 6 Bilateral contractile springs to move 3 3 distal to spaces of 4 4.

3. Upon completion of distal movement of the four cuspids, bands will be placed upon the eight incisors for alignment—arch form and adjustment of line of occlusal plane.

4. Following the period of primary treatment, a positioner retaining appliance will be prescribed for secondary treatment period.

Prognosis.—The treatment as prescribed above for this type of case affords excellent results where, obviously, this patient possessed an excess of tooth substance in relation to supporting structures. Also, the maintenance of the end result is comparatively simple by use of the Kesling type functional retainer.

SUMMARY

I believe I am safe in assuming that we all have arrived at the same station in our thinking that in certain dentofacial anomalies extraction of dental units is indicated. The question confronting us is not whether to extract or not to extract, but when to extract and when not to extract.

In this series of case reports, we have seen two cases through the stage of primary treatment. I believe you will agree with me that had extraction been executed irreparable harm would have been cast upon these children.

In the other two cases presented with predetermined setup casts, one clearly indicates the folly of extraction while the other definitely indicates the necessity for extraction of four dental units for dentofacial esthetics.

REFERENCE

Kesling, H. D.: The Philosophy of the Tooth Positioning Appliance, Am. J. Orthodontics and Oral Surg. 31: 297-304, 1945.

First National Bank Building.

A METHOD OF ALIGNMENT AND CONTROL OF ANTERIOR TEETH FOR USE WITH LABIAL AND LINGUAL ARCH WIRES (EXTENSION LINGUAL AND LABIAL ARCHES WITH INTERDENTAL WIRING)*

PRYOR A. WILLIAMS, D.D.S.†

THIS technique was developed by the writer and is given for your consideration. It is employed in the treatment of a case after the desired expansion has been obtained or after extractions have been made, depending on which philosophy you follow.

At the present time there are two general techniques for the treatment of malocclusions, namely, labiolingual technique and the various methods using bands, some methods banding as few as twelve teeth and others banding all the teeth. It would seem since these two general methods have been used extensively that they both have merit. The greatest weakness of the labiolingual technique is the rotation of teeth, and its universal criticism is that you cannot finish a case with it because you have no positive control on the tooth. The greatest criticisms of the banded techniques are the placing of so many bands with possibility of injury to the teeth, soreness following the separations, the difficulty of alignment, and, last but not least, the horrible appearance of all these bands in a patient's mouth. The banded techniques are at a distinct disadvantage in treating girls.

Using extension labial and lingual arches with interdental wiring, it is possible to use all the desirable qualities of both of the methods without employing any of the undesirable features of either. The author of this technique believes that the most efficient and physiologic of the banded techniques are the ones employing small stainless wires throughout the treatment of a case. It is very evident that it is desirable to use the smallest wire possible that has enough strength to move teeth. It is also desirable to have just as much spring in the wire as is possible. The wire which has this quality is the small unannealed stainless steel wire.

The technique consists of wrapping a 0.014 unannealed stainless steel wire on the lingual arch. It is wrapped two turns on one side just behind the stabilizer that usually rests between the cuspid and the first premolar. The wire makes a gentle curve, long enough to rest on the lingual surface of the anterior teeth, and is wrapped two turns just posterior to the stabilizer on the opposite side. This wire is the mainspring of the technique and is very easily adjusted since it can slide anteriorly and posteriorly on the 0.040 arch wire. The recurved springs on the lingual arch stop its backward movement, but if the lingual arch does not carry these or other springs, it will slide back to the locks. If you have recurved springs, the limit is about one-half inch on each side, making an inch

†Deceased.

*Presented before the Southern Society of Orthodontists, Atlanta, Georgia, Oct. 23 and 24, 1944.

combined. In other words, your adjustment is about an inch and if you miss it further, you have to remove it and make another. This extension has to be long enough to come in contact with the lingual surfaces of all the anterior teeth without too much excess wire. If it is too short, the action is lost. This wire should be wrapped at both ends so the clipped ends will be pointing toward the teeth and not toward the tongue. It should also be cut on the under or tissue side. The end is as sharp as a needle and it is impossible to cut it closely enough to avoid scratching the tongue if it is cut with the end pointing toward the tongue.

The lingual and labial appliances are then placed in the mouth and 0.012 annealed stainless steel wires are threaded between the anterior teeth from cuspid to cuspid, engaging the lingual extension and the labial arch wire. In bringing the wire back over the labial arch, it can usually be pushed through from the incisal with a Gordon saw, thus saving the time of threading the wire between the teeth. Now all you have to do to straighten the teeth is to twist the interdental wires. The final effect is the compression of each individual tooth between the 0.014 lingual extension and the labial arch wire. Wired in this manner, each tooth has two bearings and the pressure is brought to bear at the extreme mesial and distal of each tooth. It gives you the same effect that you would get from a band with the bracket the full width of each tooth. Obviously, you cannot use brackets of this length. In some mouths, due to the shape of the teeth, there is a tendency for the lingual extension to slide incisally as the interdental wires are tightened. This can be offset by adjusting the labial arch wire gingivally so that it will hold the wiring in place.

You can readily see that it can be used in anchoring the anterior teeth against the posterior teeth without any malalignment of the anterior teeth at all. It is an aid in the opening of bites by simply adjusting the 0.040 arch wire gingivally, then pulling it incisally and tying it in position. Of course, this is used in conjunction with the intermaxillary elastics.

I have tried various combinations with these small wires and find that from the standpoint of strength and efficiency the previously described combination is best. In a few cases in which an incisor was rotated nearly ninety degrees, an auxiliary wire has been wrapped on the labial appliance and this small wire engaged along with the lingual extension between all the anterior teeth and an additional wire between the central incisors engaging both small wires and the labial arch wire for stability. For badly rotated cuspids and incisors which are rotated halfway or more, we band these teeth until they can be engaged in the previously described manner.

It is my sincere wish that many orthodontists will give this technique a trial, particularly those using any form of the labiolingual technique in which a removable lingual appliance is used.

Any inquiries about this technique should be directed to Dr. W. Ross Williams, son of the author, who was associated with him during its development. The address of Dr. W. Ross Williams is as follows: 1005 Protective Life Building, Birmingham, Alabama.

LIGATURE ADJUSTER FOR THE EDGEWISE ARCH MECHANISM

Rodolfo Tarasido, D.D.S., Buenos Aires, Argentina

SEVERAL orthodontic appliances have been designed during the last few decades by well-known orthodontists. Most of these appliances meet the requirements for the movements of the teeth.

Some seem to be more satisfactory, however, than others. It is not the intention here to discuss the relative merits of each appliance by making a comparative study. However, the edgewise arch mechanism offers very satisfactory possibilities for the correction of any class of malocclusion. This mechanism, in which brackets and arch wire coordinate, requires skill and wide clinical experience.

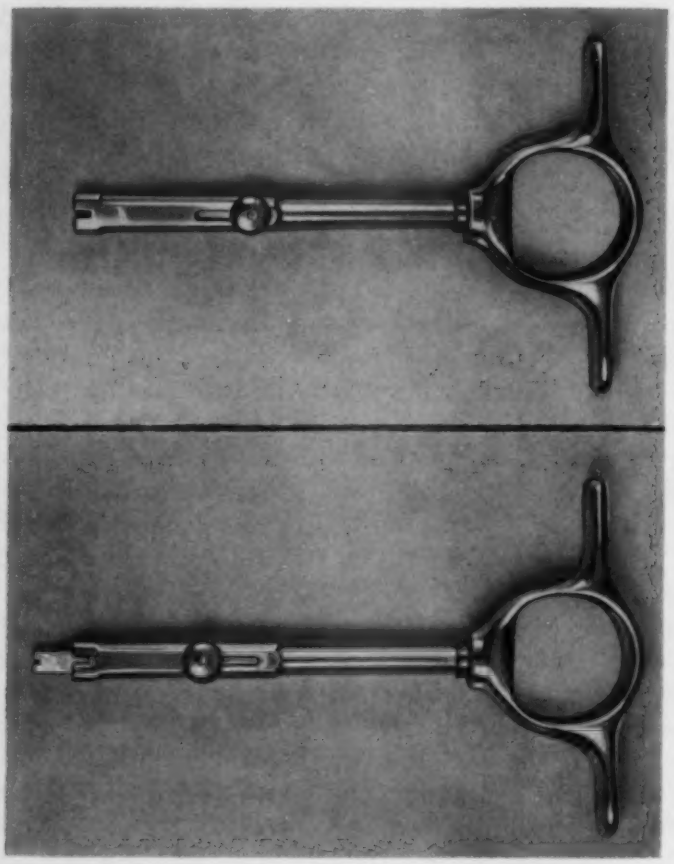


Fig. 1.

The need of tying every bracket to the arch wire requires many ligatures and this operation necessitates great care and time. An adjustment that I have designed makes the application of the ligatures easier. The adjustment contains

two main members, the handle at one end, and the second piece is similar to a sheath or a hollow shaft that fits inside the outer tubular stem and can be put into action by a control button attached to each side of the instrument. The free end of the outer stem is provided with slots which are aligned with similar grooves made in the free end of the inner sheath. In these latter grooves the arch wire is fitted when not lodged in the slot of the bracket, making this part of the instrument also suitable as it can be used as a torque. In order to apply the arch wire, the instrument is grasped by the handle and then with the thumb and forefinger on the control button and the wire is looped about while the free strands of the wire are held with the other hand.

Fig. 2.

The arch wire is fitted in the grooves of the projection sheath and the assembly is then pushed toward the teeth in the direction of the bracket. The arch wire is then carried into the slot of the bracket, whereupon the free end is moved forward and exerts pressure on the handle of the instrument. The ligature wire which surrounds the projection sheath will then be dragged by the end of the outer stem. Actuating by means of the control button, the inner portion or sheath is retracted, releasing entirely the ligature wire which falls on the wings of the bracket. It is thus fixed, making a quarter twist in the wire and thus having it ready prior to the use of the ligature locking plier or else giving several twists forming a little pigtail that can be concealed underneath the arch wire.

The successful use of this ligature adjuster has been the inspiration to make the instrument.

ESMERALDA 542.

REPORT OF THE COMMITTEE ON EDUCATION TO THE BOARD OF DIRECTORS, AMERICAN ASSOCIATION OF ORTHODONTISTS

At a meeting of the Board of Directors, held in Colorado Springs, your Committee on Education asked for approval of a plan to canvass the schools of dentistry holding membership in the American Association of Dental Schools for the purpose of preparing a proposed minimum curriculum for graduate and postgraduate study. This was approved.

To this end such curriculum was finished in December, 1946. It was based on over twenty-five years' experience in the teaching of orthodontics. It embraced a whole-time course extending over a period of fifteen months—sixty-five weeks, allowing six weeks' vacation—continuous studentship, totaling 2,300 calendar hours, 1,000 of which are devoted to practical work, and rating fifty academic credits. With this under the *graduate* faculty, it would lead to the M.S. degree. Under the orthodontic department of the dental faculty, it would lead to a "Certificate of Proficiency in Orthodontics" or its equivalent, awarded by the trustees of the university. The total hours and academic credits are practically the equivalent of two years of academic work. A mailing list was obtained from the Secretary of the American Association of Dental Schools and all was ready for the mailing of the questionnaire in October, 1947.

However, the action taken by the Dental Educational Council of the American Dental Association, at its last annual meeting in Boston, August, 1947, made the pursuit of the foregoing plan seem unwise. The Dental Educational Council prescribed courses of two college years for specialization in oral surgery, orthodontics, pedodontics, periodontics, and prosthodontics. While the course which we prepared is the practical equivalent of two academic years, it is the opinion of your Committee that the American Association of Orthodontists should, through its Committee on Education and its teacher members, work with the Dental Educational Council to a satisfactory solution of our vexed problem, not only in postgraduate and graduate courses but in undergraduate and in the so-called refresher and continuation courses under the University Extension Department or of the Dental Faculty.

Our reason for advocating fifteen or more months of *continuous* work, in contradistinction to two academic years, is based on the demands of the orthodontic clinic. We are convinced, as the result of over a quarter-century of continuous experience as Director of Orthodontics embracing all four phases of the work, that a thorough preparation for practice, teaching, and for research is based upon an adequate experience in the orthodontic *clinic*. The demands here differ from all other clinics in the dental school in that the service must be continuous throughout the entire calendar year, just as in private practice. Orthodontic treatment, to be efficient and safe, cannot be interrupted by four neglected months each year elapsing between the academic years of eight months. And, too, it is important that the patient be given treatment by the same operator through the entire course so that the operator can follow the result obtained by him personally. This is essential to most efficient teaching. Patients treated by different students do not as a rule make as good progress as when one operator concentrates on the treatment and is held responsible for the result.

The curriculum of two academic years proposed by the Dental Educational Council also affects the standards and functioning of our American Board of Orthodontics. This Board has been an official incorporated body under the American Association of Orthodontists for the past nineteen years, has set up high standards, and has certified approximately three hundred diplomates, which means about one-third the membership of our Association. The Dental Educational Council was not ready to accept present standards of the orthodontic board and gave them until 1951 to reach a satisfactory accord. The Council expressed willingness to send a representative to confer with our Committee on Education and the Board of Orthodontics.

Here again the Committee would beg to recommend an understanding approach. The Council undoubtedly has for its purpose the patterning of standards in general on a level

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Presented at the Forty-fourth Annual Meeting of the American Association of Orthodontists, Columbus, Ohio, April 26, 1948. Approved by the Board, April 28, 1948.

The report was prepared by the Chairman based on his personal experience, and was concurred in and signed by the other members of the Committee on Education.

as high as those of medicine so that diplomates of the specialties of dentistry may receive hospital or other appointments pertaining to the public health on the same general level. This is most important. We have hope that the Dental Educational Council, when fully appraised of the standards set up and maintained by our specialty board, will be ready to give full consideration. This is so inseparably integrated with our educational problems that here again we feel hopeful that understanding consideration will be accorded our Committee on Education when conferences are arranged for discussion of the special considerations affecting orthodontics that differ from those of the other dental specialties.

At a conference of the Dental Educational Council held in Chicago in February, 1948, we are reliably informed by officers of our Association who were in attendance that we were accused of having been unwilling through the years to help solve the problem of orthodontic education, especially for the undergraduate. We must here go on record.

It has been our good fortune to have been a member of the American Association of Dental Schools and its predecessors from 1900 to 1945. We attended nearly all of its meetings. For quite a number of years we served on its committee on education, taking our turn as chairman, and we here desire to assert that during all of these years teacher members of our Association repeatedly offered outlines of courses for the undergraduate, graduate, postgraduate, and advocated advanced instruction for orthodontists under University Extension. These reports were published regularly in the annual proceedings of the American Association of Dental Schools and in the *Journal of Dental Education*. The unvarying result of these efforts through all these years was, in general, one of merely passive interest on the part of teachers in the other branches of dentistry, especially the clinical divisions. Lack of time has been the principal excuse but, in our humble opinion, lack of understanding of the orthodontic problem and unwillingness on the part of clinic teachers to cooperate in providing sufficient time for a thoroughgoing orthodontic clinic and their persistent desire for more time for their own work were the real causes behind that. It was impossible to convince the body of the essential importance of adequate clinical training. We insist that it is just as necessary to give thorough *clinical* training for orthodontic practice as it is for operative dentistry, prosthetics, or any of the other clinical branches of dentistry.

That there is not sufficient time for this in the undergraduate curriculum as it has been set up without adding a year or by reducing considerable of the technical and clinical work in other branches is obvious. This latter has been tried in one school but the student electing clinical orthodontics in the undergraduate course was not adequately prepared for general dentistry. And, more important, the remainder of the student body was almost wholly without any orthodontic training. This latter condition exists today in most schools. We reaffirm that the undergraduate student must be given thorough instruction in *prevention* in orthodontics. He should be well taught the *normal* in *growth* and *development*, especially as it pertains to the head, face, and jaws. From this as a basis to reckon, he should be taught to *recognize early* those factors which *predispose* to *malocclusion* and either correct these himself or refer the patient for treatment. By so doing, the general practitioner of dentistry could prevent the necessity for corrective treatment of aggravated and complicated cases in at least 35 to 50 per cent. This would be most helpful in solving treatment for the people.

Because of lack of time in the undergraduate curriculum and also because only a comparatively small percentage of dental students are especially interested in clinical orthodontics, it has been accepted at long last by dental educators that for specialization it is necessary to offer graduate and postgraduate courses. The present pressing demand for these courses is evidence of the need for them.

There is no short cut for a general practitioner of dentistry to prepare himself adequately to do forthright orthodontics except in the field of prevention. If he has decided to do orthodontics, he should be willing to prepare himself properly to give thoroughly good service. We do not subscribe to the commonly made statement that it is the right of the general practitioner to attempt any or all special branches of dental practice upon graduation. Morally he has a right to attempt *only* those branches in which he has adequately prepared himself to render safe and capable service. In attempting treatment beyond his capability, he makes himself culpable. No dental college has ever even pretended to prepare its undergraduate

students for any branch of specialization upon graduation any more than is done in undergraduate courses in medicine and surgery. Postgraduate work is necessary in orthodontics, oral surgery, and other specialties, just as surely as it is in surgery and medicine. And any dentist, physician, or surgeon who cannot properly prepare himself should not be allowed by law to hold himself out as competent to specialize. The public, the profession, and especially he himself will ultimately suffer a deserved reward.

The Secretary of the American Association of Dental Schools was asked if a conference for joint discussion might be arranged. He wrote to us in part as follows:

> The Association does not have a Committee on Education. It does have, however, a Committee on Teaching which might serve the purpose which you have in mind. Lloyd E. Blauch, Ph.D., Senior Specialist in Higher Education, U. S. Office of Education, Federal Security Agency, Washington 25, D. C. is Chairman of this Committee and I might say that he is perennially its chairman for I have no doubt the Association will re-elect him to that position just as long as he will accept the responsibility.
>
> Something peculiar has happened among the orthodontic teachers. Two years ago the conference group on orthodontia was asked to prepare a program for the 1946 Meeting, but failed to do so. They were again consulted for 1947 and again there were no results. As a consequence there is not now in the Association and, unfortunately so, a committee or a conference group which is concerned with orthodontia. I am sure that Dr. Blauch has made repeated efforts to have this group become active, but apparently he has not been overly successful in his efforts. I would suggest that it might be well for you to write a letter to Dr. Blauch, for I am sure he could be of considerable help to you.

We wrote to Dr. Blauch under date of April 13, 1948, but so far have received no reply. We are led to believe that he will welcome our cooperation and give us his full assistance as it has been his desire to have orthodontic teaching placed on a sound, workable basis for several years.*

Your Committee has also written to the Secretary of the Dental Educational Council, Dr. Harlan H. Horner. A cordial reply was received. He enclosed a copy of the requirements of the Council for the approval of a specialty board which have been approved by the House of Delegates of the American Dental Association.

Dr. Horner stated that four boards were approved last February, namely, Oral Surgery, Pedodontics, Periodontology, and Prosthodontics. He spoke of correspondence and an interview with Dr. deVries last February. He said also, "After you have looked over the requirements, I shall be glad to hear from you again if I can be of help to clear up any question which still remains in your mind."

We suggest that further correspondence with Dr. Blauch and Dr. Horner be continued.

Recommendation.—That the Committee on Education be instructed by the Board of Directors to arrange for a joint conference between the American Board of Orthodontics, the Dental Educational Council of the American Dental Association and representatives of the American Association of Dental Schools. This should be done at the earliest time convenient to all. We urge that an effort be made to arrange for this at the approaching meeting of the American Association of Dental Schools to be held in Buffalo next June 20-23.

We would consel that the approach be made in a spirit of kindly understanding. It undoubtedly is the purpose of the Dental Educational Council to work out a plan that will result in benefit to all concerned, and a friendly spirit will be most helpful. It will take much work and time, but the solution of this important problem should be diligently pursued until a plan satisfactory to all is worked out.

Respectfully submitted,

GEORGE M. ANDERSON,
WALTER T. MCFALL,
LEUMAN M. WAUGH, Chairman.

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*A letter from Dr. Blauch, under date of April 22, 1948, was delivered after we had left for the meeting and was not seen until after our return. He says in part: "The Committee on Teaching, American Association of Dental Schools, of which I am chairman, appointed a committee several years ago to prepare a report on teaching orthodontics to dental students. . . . was made chairman of the committee. For various reasons, . . . has not found it possible to do anything about this matter and therefore no report has been prepared and no conference has been held on this subject.

"We have definitely in mind dealing with this subject before long, and if we find that . . . is not able to handle the matter, we shall appoint another committee."

Editorial

The Columbus Meeting of 1948

The Forty-fourth Annual Meeting of the American Association of Orthodontists was held at the Neil House, Columbus, Ohio, Monday, Tuesday, Wednesday, and Thursday, April 26, 27, 28, and 29, 1948. Under the leadership of President Earl G. Jones of Columbus, aided by his efficient committees, the meeting was a great success. The registration, including orthodontists and their wives, is said to have been in excess of 1,200, the largest attendance in the history of the organization.

The meeting of the American Board of Orthodontics was held before that of the American Association. The date of its first session was Friday, April 23, and periodical sessions were held until and including Sunday, April 25. The Board had entirely concluded its transactions by the time the American Association of Orthodontists opened its sessions.

The first day of the meeting was devoted to recreation and to preliminary committee meetings. The annual golf tournament was held at the Columbus Country Club, and this was followed in the evening by a stag dinner staged in the Grand Ballroom of the Neil House. Under the leadership of Dr. Fred B. Aldrich, the stag dinner featured an excellent floor show. The presentation of the golf awards followed the entertainment.

An entertaining program was provided by the wives of the orthodontists. This consisted of a reception at the Columbus Athletic Club, buffet supper, book review, and a concert by the Chapel Choir of Capital University. The Choir concert was attended by practically all the visiting guests and proved to be one of the outstanding entertainments ever provided for the American Association of Orthodontists. Much comment was heard about this remarkable presentation of trained voices. In addition, the ladies attended a matinee at the Hartman Theater. Under the direction of Dr. George M. Anderson, Dr. George R. Moore, and Dr. Fred W. Black (the Program Committee), an unusual program was arranged. The theme presented was "Rational orthodontic procedures." The papers were presented in a sequence planned to coordinate and carry through to completion the treatment of an orthodontic patient.

Subsequent to the innovation by Dr. Walter S. Sargeant, Hon. Paul M. Herbert, Lieutenant Governor, extended greetings to the organization. Response was then made by Dr. Lowrie J. Porter, President-elect of the American Association of Orthodontists. Carrying out the unique plan of the Program Committee, the scientific part of the program was opened by a highly interesting discussion of the consultive period of practice by Dr. James D. McCoy, of Beverly Hills, California. "Case Analysis" was then thoughtfully treated by Dr. L. Bodine Higley of Iowa City, Iowa, after which Dr. Jack Salzmann of New York discussed prevention and interception of malocclusion, and this concluded the program for the Thursday morning session.

The annual Past-Presidents' Luncheon was held at noon Thursday, and the afternoon session opened with a discussion, "Oral and Environmental Conditions," by Dr. John R. Thompson of Chicago. This was followed by "Radiographic Analysis," by Dr. William Simon, of Minneapolis, Minnesota, and Dr. B. Holly Broadbent then presented an interesting discussion, "General and Facial Development," in which he elaborated and added to the amazing work he has done in the past on this subject.

The evening session opened with a classical concert by the Chapel Choir of Capital University, and this proved to be a marvelous entertainment. President Earl G. Jones delivered the annual President's address, and this was followed by the presentation of the Albert H. Ketcham Memorial Award to Dr. Clinton Chappel Howard of Atlanta, Georgia, for his contributions in the field of skeletal growth and development and endocrinology.

Dr. William B. Downs, of Aurora, Illinois, Associate Professor of Orthodontia at the University of Illinois, received a $500 research award. Dr. Earl G. Jones, President, and Dr. Lowrie J. Porter of New York, President-Elect, were the recipients of a good will award made in behalf of the Cuban National Dental Association by Dr. Sergio Gequel of Havana.

On Wednesday morning, Dr. Byron O. Hughes of Ann Arbor, Michigan, presented "Psychological and Hereditary Factors," and this was followed by "Age as a Factor in Treatment Planning," by Dr. W. Wayne White of Kansas City, Missouri. "Tissues and Changes Involved in Tooth Movement" was then presented by Dr. Myron S. Aisenberg of Baltimore, Maryland.

At the afternoon session, "The Fundamentals of Anchorage, Force, and Movement" was presented by Dr. A. C. Rohde, of Milwaukee, Wisconsin, which was followed by "Treatment Planning and Treated Cases," by Dr. Ashley E. Howes of New York City; the same subject was discussed by Dr. E. C. Lunsford of Miami, Florida.

The presidents' reception banquet and dance was held on Wednesday evening in the Grand Ballroom of the Neil House. The banquet proved to be a gala affair, and it was followed by an elaborate floor show. Of great interest and entertainment to the visiting guests was the fact that the master of ceremonies for the banquet was the talented practicing dentist, Dr. Eddie Ball of Cincinatti, Ohio. Dr. Ball not only did a masterful job as master of ceremonies, but proved to be a great entertainer in his own right. The audience was with him from start to finish.

Thursday morning's program began with a discussion of "Treatment Planning and Treated Cases," by Dr. William M. Jarrett of Charleston, West Virginia, Dr. Dan C. Peavy of San Antonio, Texas, Dr. Will Thompson, Jr., of Pittsburgh, Pennsylvania, and Dr. J. William Adams of Indianapolis, Indiana. Retention was then discussed by Dr. Raymond Webster of Providence, Rhode Island. The entire Thursday afternoon was devoted to a wide assortment of table clinics. The clinics revealed a tremendous amount of work both on the part of the committee and the clinicians. To Dr. Fred Black must go much of the credit for the comprehensive clinic program.

Outstanding impressions gained at the meeting were the tremendous attendance, the intense and quiet attention given to the essayists, and the strict adherence to the program schedule. Much talk was heard in the corridors about the phenomenal growth in attendance and the apparent vigor of the American Association—members came from Maine to California, from Latin America to Canada. The meeting assumed an international aspect with the attendance of an outstanding Norwegian orthodontist, Dr. Trygve Gythfeldt, of Oslo, Norway, who arrived in Columbus following a twenty-six-hour airliner flight by way of Iceland and Labrador.

Many congratulations were conveyed to President Jones and his hard-working committees for having arranged one of the outstanding meetings of the American Association of Orthodontists. Columbus, even with the conflict of an Elks' convention the day prior to the scheduled meeting of the Association, did not permit that to stop its enthusiasm, and both the city and the committees did a fine job.

The present membership of the American Association of Orthodontists reported by the secretary is 903, an increase of 135 members since the Colorado Springs Meeting.

The result of the election at Columbus was as follows:

President-Elect, Max E. Ernst
Vice-President, William R. Humphrey
Secretary-Treasurer, George R. Moore

The election of new committee members was as follows:

	NUMBER OF YEARS
Librarian, Richard A. Smith	3
American Board of Orthodontics, R. L. Webster	7
Budget Committee, Henry U. Barber, Jr.	3
Editorial and Publication Board, Joseph D. Eby	3
Public Relations Committee, Frederick R. Aldrich	3
Committee on Education, Allan G. Brodie	3
Research Committee, Wendell L. Wylie (unexpired term of Dr. Hellman) B. Holly Broadbent	3
Constitution and Bylaws Committee, E. N. Bach	3
Relief Committee, Leo M. Shanley	3
Laws and Infractions Committee, Ralph G. Bengston	5
Judicial Council, M. D. Edwards	3

Nominations for office were as follows:

Joseph E. Johnson, President-Elect
Sergio E. Giquel, Vice-President
George R. Moore, Secretary-Treasurer

H.C.P.

Resolutions of the American Association of Orthodontists

FREDERIC T. MURLLESS, JR.

On March 11, 1948, the dental profession was shocked to hear of the death of Frederic T. Murlless, Jr. Dr. Murlless died at his home, 245 Kenyon Street, Hartford, Connecticut.

He received his preprofessional education at the public schools in Windsor Locks, Connecticut, and graduated from the New York College of Dentistry, now New York University School of Dentistry, in 1892, and from the Angle School of Orthodontia in 1906.

Dr. Murlless was a former president of the Connecticut Dental Commission, the New England Dental Society, the American Board of Orthodontics, the Eastern Association of Angle graduates, and the New York Society of Orthodontists. In addition to serving as president of the above-named societies, he was president of the Horace Wells Club in 1922, the Jeremiah Wadsworth branch of the Sons of the American Revolution in 1928; he was past governor of the Connecticut Society of Founders and Patriots. He was a member of the American Dental Association, the Connecticut State Dental Association, the Hartford Dental Society, the American Association of Orthodontists, the Northeastern Society of Orthodontists, the Southern Society of Orthodontists, the European Orthodontological Society, the New York Academy of Dentistry, the American College of Dentistry, the Omicron Kappa Upsilon Honor Society, and the Delta Sigma Delta Fraternity. He was a Knight Templar and a Thirty-second Degree Mason.

Dr. Murlless was a member of the Hartford Rotary Club, Twentieth Century Club, Hartford Club, and the University Club. He was a member of the medical and surgical staff of the Newington Home for Crippled Children.

Dr. Murlless was born Nov. 4, 1862, in Windsor Locks, Connecticut, son of the late Frederic T. Murlless and Ellen Perrin Murlless. His wife was the late Maria Leonora Maia Ferreira.

He leaves two brothers, Arthur G. Murlless and Judson T. Murlless of Phoenix, Arizona, a sister, Miss Elizabeth Perrin Murlless of New York, a daughter, Mrs. Frank Lambert of Sea Cliff, Long Island, and four grandchildren, Mrs. Andrew Robertson of San Francisco, California, Frank Lambert, Jr., and Jonathan and David Lambert of Sea Cliff.

Dr. Murlless was a prodigious writer, and contributed much to our orthodontic literature. It is not necessary to enumerate all of his many essays, papers, and discussions given before the various orthodontic and dental societies. The better dental and orthodontic journals of this country by their eagerness to

Written and read by Dr. Ralph W. Waldron at the request of the Necrology Committee for the American Association of Orthodontists.

print his papers bear evidence of his ever-increasing willingness and ability to contribute to our common stock of orthodontic knowledge.

Therefore, we will briefly state a few of his contributions as they appeared from time to time. They are as follows: "Orthodontic Appliances," "Diagnosis," "Etiology," "Oral Conditions in School Children," "Occlusion," "Oral Hygiene," "Metallurgy As Applied to the Metals Used in the Correction of Malocclusion," "Office Records and Professional Library Building," "Application and Construction of Locking Device for Orthodontic Arch Appliance," "Making Bands for the Rotation of Cuspids, Bicuspids, and Incisor Teeth," The Diagnostic Value of Gnathostatics," "The Status of the Dental Hygienist in Dental Practice," "The Preparation of Teeth for the Correct Cementation of Bands," "Record of Treatment and Subsequent History of a Case of Malocclusion and Facial Deformity," "A Topical Anesthesia for Oral Tissues," "Address of Welcome to the American Association of Orthodontists, New York Society of Orthodontics, May, 1935," "Silver Nitrate As a Protection Against Caries Beneath Anchor Bands," "A Study in Tempering Precious Metal," "American Board of Orthodontics," "The Correction of Mandibular Subluxation," and many others too numerous to mention.

In the passing of Frederic T. Murlless, Jr., we have lost a member whose outstanding professional character reflected the highest honor upon our society and upon the dental profession. For by his untiring and unselfish labors we have been greatly benefited. To know him was to admire his superior knowledge and experience which he most generously shared with all who desired to avail themselves of his sound judgment.

Let our young men never forget, and let them learn from the example of this just and kindly soul, that diligent study, systematic work, earnestness, contemplation, and solidarity are the cornerstones on which alone a practitioner can build up a name worthy of being enjoyed and capable of being handed down to posterity.

Frederic T. Murlless, Jr., had great advantages and developed and used them for the benefit of many. Born with an enviable inheritance, his father being a much-loved and respected dentist, he enjoyed a thorough general and special education, which fitted him for his chosen lifework. He possessed an imposing presence, pleasant manner, and an equable temperament.

He was a thoroughly modest man who realized how difficult it is to master the depths of knowledge and apply them to his everyday problems, and to the benefit of others. He had an unusual degree of common sense, which limits aspirations and aims. Therefore he became thorough in what he undertook to practice as his lifework, and in so doing enjoyed the confidence of both the profession and the public alike.

There were few places of honor in the possession of the profession to which he belonged, either local, state, or national, which he has not filled with honor and dignity. Thus he lived and worked to an advanced age, ever enjoying the respect of all whose good fortune it was to know him. As a profession let us hope that we shall have many more like him.

One of his favorite poems seems most appropriate here,

They told me Heraclitus, they told me you were dead
They brought me bitter news to hear, and bitter tears to shed
I wept as I remembered, how often you and I
Had tired the sun with talking, and sent him down the sky
And now that thou art lying, my oft beloved guest
A handful of gray ashes, long, long ago at rest
Still are thy pleasant voices, thy nightingales awake
For death he taketh all away, but them he cannot take.

WHEREAS, The members of the American Association of Orthodontists have learned with profound sorrow the passing of their fellow member, constant friend, and beloved councellor, Dr. Frederic T. Murlless, and

WHEREAS, The American Association of Orthodontists gratefully recognize his unselfish and skillful labors exemplified by his generous and valuable contributions which have so helped to enrich our orthodontic practice and literature, and,

WHEREAS, Our members grieve over the departure of this humble, modest, and most gentlemanly member, whose labors have ever been in the interest of his chosen profession, and always at the exclusion of any personal ambition. Therefore,

BE IT RESOLVED, That this sense of deep bereavement, though inadequately expressed, be spread upon our minutes as an everlasting memorial to him who labored long and well for the benefit of his fellowman and the profession he so dearly loved.

BE IT FURTHER RESOLVED, That a copy of these resolutions be sent to the members of his family as an expression of our sympathy and heartfelt condolence.

Respectfully submitted,
THE NECROLOGY COMMITTEE.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Orthodontische Fortbildung fur den prakt. Zahnarzt (Orthodontic Education for the General Practitioner): By Prof. Dr. Med. R. Hotz. 134 pages with 204 illustrations. Medizinischer Verlag, Bern, Switzerland, Hans Huber, 1947.

This book is the result of postgraduate courses in orthodontics given by the author before the Swiss Dental Society. It is a manual for the general practitioner and deals with various phases of orthodontic prevention and the simpler orthodontic procedures. The aim is to acquaint the general practitioner with the possibilities of preventive dentistry from the standpoint of its orthodontic involvements. Until recently, orthodontic procedures in Switzerland were within the reach of children only of the higher financial level. While the classical methods of orthodontic procedure appear prohibitive in cost and therefore cannot be provided in socialized dental schemes, it is hoped that preventive measures will cut down the need for more extensive treatment.

The author recognizes the danger of temporizing with the teeth of children in a field which is not well understood by the general practitioner. However, simpler procedures of a preventive nature and early simple treatment are nevertheless possible. A discussion is presented on the development of the positional anomalies of the jaws and teeth as well as of normal occlusion. It is pointed out that the advice often given parents that it is too early for their children to have orthodontic care is frequently followed by the announcement that it is already too late. In both instances the advice frequently stems from ignorance of the basic principles of orthodontics.

The common error in portraying the allegedly correct methods of breast and bottle feeding in the infant are here repeated. On page 23 the infant is shown as grasping the nipple with his alveolar process. A fact which is not generally recognized is that the infant grasps a portion of areolar tissue as well as the nipple between its jaws. This mass of tissue is held not only by the alveolar process but between the tongue and the palate. Milk is expressed by the contraction of the muscles which produce forward and upward movement of the mandible exerting pressure on the tissues. This pressure leads to a spreading action on the jaws as opposed to the constrictive sucking accompanying bottle feeding.

Sleeping positions and mouth breathing as factors in malocclusion are presented in the usually accepted manner. The effects of early loss of deciduous and of permanent teeth, tongue habits, and sucking habits are given consideration. Sectioned plates as orthodontic appliances are fully presented. Extraction of teeth as a prophylactic therapeutic measure is discussed.

Extraction is advised where it is desirable to have shifting of the teeth. It is misleading to speak about indications for extractions in terms of desirable shifting of teeth without indicating also that desirable shifting of teeth does not usually follow extracton without the aid of orthodontic mechanotherapy.

Shifting of teeth after extraction, as shown by Salzmann, is subject to many influences which control the rate and direction of the tooth shifting. Systematic extraction of teeth as a therapeutic measure in crowded dentitions is certainly not to be followed in the United States without endangering the high status achieved by orthodontics in our country. Perhaps the most dangerous approach to children's dentistry is the mistaken notion that extraction is a "cure" for crowded teeth.

The Child Patient as a Future Periodontal Problem: By B. O. A. Thomas, D.D.S., M.S., Ph.D., Seattle, *J. Am. Dent. A.* **34**: 763-774, Dec. 1, 1947.

HYPOTHYROIDISM

Comroe, Collins, and Crane stated that patients with hypothyroidism constitute a large percentage of all persons consulting the orthodontist. The faulty jaw development results from malocclusion and faulty eruption of the teeth.

The thyroid gland, by regulating the metabolic rate, is extremely important in the maintenance of normal growth and development. A decrease in activity of the thyroid gland is reflected in the oral cavity by a retarded development of the jaws, a slower rate of eruption, and a delay in shedding of the primary teeth. In cretinism it is not uncommon to see a progressive deterioration of the teeth. This may lead to early loss of several teeth, most commonly the first molars.

Brauer described an interesting case of hypothyroidism in which an extreme open-bite became almost completely closed as the result of administering 1 grain of thyroid extract, four times a day, for a period of four months.

Abnormalities of alignment or occlusion which occur during childhood as a result of hypothyroidism are often responsible for periodontal as well as orthodontic problems in later life. Treatment of the underlying cause of the disease by means of thyroid extract has been spectacularly successful. Such treatment should be undertaken as early as possible, because the sooner treatment is begun the fewer will be the residual effects of the disease.

There is often a delayed or faulty eruption and malalignment of the teeth associated with the stunted growth and retarded bony development which are typical of this condition. Rotated or malpositioned teeth allow food impaction, with gingivitis resulting from trauma to the soft tissues.

Cases of subclinical scurvy exist in patients of all ages, and the differential diagnosis may be difficult. Campbell and Cook developed the following therapeutic test for detecting avitaminosis C:

> No local treatment is instituted, but the patient receives 300 mg. of ascorbic acid daily for a period of five days. If a viamin C deficiency exists, a rather dramatic improvement of the gingival condition occurs. If such improvement does not occur, the patient is not regarded as deficient in vitamin C.

Intensive local treatment alone in cases of scurvy will not result in complete cure of the gingivostomatitis. Until the blood level approaches the normal of 0.5 mg. per 100 c.c. and remains there, a residual gingival infection will be present.

Whether a low level of vitamin C in the blood results in the classical oral symptoms of scurvy or merely in a subclinical state of this disease will depend on several factors, including the degree of deficiency and the patient's ability to absorb and utilize the vitamin, once it has been ingested. Should the condition of avitaminosis C persist for a period of years, definite periodontal dis-

ease will develop, with loosening and drifting of teeth, malocclusion, food impaction, and pocket formation.

Epilepsy is an abnormal state of the central nervous system, in which the patient loses consciousness periodically. Convulsions may occur while the person is unconscious. Although the symptoms have been recognized for hundreds of years, the essential disease process of epilepsy is still unknown.

The seizures which are typical of this disease may be controlled by the use of bromides, barbiturates, or Dilantin sodium (diphenylhydantoin sodium). The disadvantage of employing sedation in the control of the attacks is that the patient may remain almost constantly in a much less alert condition than normal. In many cases treatment with Dilantin sodium resuls in marked fibrous hypertrophy of the gingivae. This may become so extensive as to necessitate surgical removal of the hypertrophic masses of tissue. Vigorous massage and scrupulous oral hygiene may prevent this proliferation or at least retard the process. It is important that the smallest effective dosage of Dilantin sodium be used, in order that the gingival hypertrophy be held to a minimum.

In congenital syphilis many of these abnormal permanent first molars are lost at a relatively early age, leading to a collapse of the arch and its usual periodontal and orthodontic implications.

A hyperplastic gingivitis develops in the mouths of some children. This is most common in mouth breathers and is usually limited to the labial gingivae of the anterior teeth, with the interdental papillae being especially involved. Treatment depends, naturally, on the cause of the mouth breathing, which is often a result of hypertrophied pharyngeal tonsils (adenoids). If the habit is associated with a marked malocclusion, orthodontic correction is indicated. If the hyperplastic gingivitis persists into the adult period, a definite periodontal problem will exist.

Faulty restorations, heavy deposits of calculus, and trauma incident to malpositioned teeth are among the factors which keep the gingival tissues in a state of lowered resistance. Every effort should be made to eliminate all such predisposing factors in order to preclude this constant threat to the health of the periodontium during the ensuing years.

A great many dental restorations, for one reason or another, leave much to be desired. A few of the examples of faulty dentistry are: open contacts; large excesses of filling material in the interproximal regions; proximal cement fillings which have dissolved, allowing the teeth to drift together; incorrectly designed clasps which impinge on the gingival tissues. The effects of such improper technical work on the individual tooth, the occlusion, and the supporting structures of the teeth are important factors in the prognosis of the individual periodontal problem.

Abnormal forces applied to the teeth and jaws will, if continued for sufficient periods of time, result in movement of teeth out of their normal positions and will also cause changes in the contours of the facial structures. The results of such habitual practices as thumb- or finger-sucking, lip- or tongue-biting, and tongue-thrusting produce very real problems in the field of preventive periodontia as well as in orthodontics.

These habits may create few harmful effects if abandoned sufficiently early. If they are continued into the period of transition from primary to permanent teeth, the resulting malocclusion and irregularity may present a real threat to the health of the periodontium.

Bruxism is a condition in which the patient unconsciously grinds the teeth together. Children practice the habit most vigorously during periods of nervous stress, when fatigued, or during sleep. The excessive stresses placed on the resorbing roots of the primary teeth and the incompletely developed roots of the permanent teeth may result in serious damage to the periodontal tissues.

It is usually necessary to construct a removable occlusal splint to relieve the pressure on individual teeth. Such a splint, worn usually only at night, often suffices to break the habit within a relatively short period of time.

Premature Loss of Teeth.—Every dentist has seen the unfortunate consequences of the early loss of primary molars. Mesial movement of the mandibular permanent first molar has resulted in loss of space, which prevents the eruption of the developing second premolar. The resulting abnormality in occlusal relations is well shown. Masticating efficiency, arch form, growth of the jaws, and health of the local periodontal tissues are adversely affected by the premature loss of a single primary molar. The use of a suitable space maintainer would have avoided the necessity for orthodontic interference, which is now imperative.

The loss of the permanent first molars is responsible for more mutilated natural dentures than any other single factor. Once any of these "foundation stones" of the arch has been lost, a series of movements and altered relations of the teeth is initiated. All such changes carry definite periodontal as well as orthodontic implications.

Delayed loss of primary teeth and irregularities in eruption of permanent teeth should lead the dentist to investigate roentgenographically the abnormal retention of primary teeth as well as the failure of eruption of permanent teeth.

Multiple impactions, congenitally missing teeth, malformed or rotated teeth, and other abnormalities of development and eruption are responsible for a number of difficult problems confronting the periodontist.

News and Notes

Central Section of the American Association of Orthodontists

The regular annual meeting of the Central Section of the American Association of Orthodontists will be held Oct. 25 and 26, 1948, at the Corn Husker Hotel, Lincoln, Nebraska.

Central Section of the Pacific Coast Society of Orthodontists

The Central Section of the Pacific Coast Society of Orthodontists met March 23 at the Alexander Hamilton Hotel.

The session was called to order at 7:00 P.M. by Secretary Lyle Russell as the Chairman, Ernest Johnson, was absent due to illness. Minutes of the previous meeting were approved as published.

Members present were: Arthur Skaife, Linus A. Huberty, George H. Grover, Reid M. Van Noate, Lyle D. Russell, H. H. Bjornstrom, J. Elliott Dunn, Earl F. Lussier, J. K. Diment, Will Sheffer, M. L. Ballard, William S. Smith, Seymore Gray, Harvey A. Stryker, Leland E. Carter, Ray A. Lussier, Fred West, A. W. Wieser, K. F. Terwilliger, Howard Dunn, Jack McMath, Fred Wolfsohn, Raymond E. Brownell, Howard H. Jan, Fred Havrilla, and Verne Smith.

Guests present were: W. R. Campbell, Raymond Curtner, Eugene E. West, Susan Locke, Peter Picard, W. E. Grenfell, L. N. Engdahl, H. S. Albarian, John H. Adams, Robert B. Murray, Everett H. Watkins, James R. Seaman, Douglas E. Chappell, G. E. Merchant, Peter J. Ceremello, Norman Synder, and Robert Y. Norton (Australia).

Raymond Curtner discussed problems relative to cases treated under the Crippled Children's Act due to the demands of the press that there be a clarification for the inadequate number of cases being treated under the C.C.A. today.

He stated that some action must be taken by the Society with regard to its objections to handling cases under the C.C.A.—and its recommendations for such corrections as might be necessary.

Dr. Fred West discussed the position of the Central Section in this matter. He stated that a meeting has been arranged with Dr. Hayes, Director of the C.C.A., and that he recommends that the Central and Southern Sections compile data relative to the C.C.A. and that a copy be sent to each member. It was suggested that all members having treated cases under C.C.A. submit a letter to Ernest L. Johnson, Chairman of the Central Section, stating briefly their experience with C.C.A. and offer any suggestions which might be helpful in improving the present set-up.

The meeting was then turned over to Ray Lussier, Program Chairman, who presented Dr. Alfred Rogers of Boston. Dr. Rogers favored us with a showing of his remarkable film entitled, "Myofunctional Therapy in Orthodontic Treatment." Fred Wolfsohn presented a patient having a finished result treated according to Dr. Rogers' technique. By the use of myofunctional therapy and a minimum of appliances, he was able to obtain a beautiful result with every evidence of stability. Dr. Rogers next conducted a discussion period and answered many questions on this interesting subject. His knowledge and enthusiasm made many of us feel that this part of orthodontic treatment is not receiving due consideration.

T. W. Sorrels

Of interest to orthodontists is the fact that Dr. T. W. Sorrels, of Oklahoma City, Oklahoma (Former Director of Public Relations of the American Association of Orthodontists), recently won the championship of the Seventh International Tampico Rodeo of Mexico. The prize tarpon with which Dr. Sorrels won the championship weighed 147 pounds, and measured six feet, six and one-quarter inches long. Dr. Sorrels received a gold-plated grand prize from President Alemán of Mexico, a large silver trophy, presented by the Secretary of the Navy, a bronze plaque presented by Eddie Rickenbacker, and many other awards.

Southern Section of the Pacific Coast Society of Orthodontists

The Southern Section of the Pacific Coast Society of Orthodontists met Friday, March 12, 1948, at the University Club, Los Angeles, California. Dr. Wendell L. Wylie of the University of California spoke on the Subject, "The Cephalometer in Orthodontics."

Fred McIntosh, as chairman of the special legislative committee appointed to study "The Crippled Children's Act," reported on progress made up to this time. After making his report he made the following motion:

"That the Southern Section of the Pacific Coast Society of Orthodontists continue its present agreement with the Los Angeles Department of the Bureau of Maternal and Child Health, Crippled Children's Services, in handling the cases certified for care under the Crippled Children's Act. Since these cases are carried on a cost basis, that the yearly fee be increased to $200 instead of the $150 paid at present to cover our increased overhead.

"That a new list be prepared of the members and guests living in Los Angeles County, and be given to the above department.

"That the cases be assigned as in the past in alphabetical order and that the members and guests be expected to accept cases for consultation when called.

"That our Chairman be authorized to appoint an orthodontist to serve on the Certifying Board of the Los Angeles County General Hospital."

European Orthodontic Society

The dates of the meeting of the European Orthodontic Society have been changed to Friday, Saturday, and Monday, July 16, 17, and 19, 1948. The change was made for the convenience of European colleagues and because of the meeting of the American Dental Society of Europe, which will be the following Monday, July 26. It is hoped that many American friends and colleagues will be able to attend.

Inquiries should be sent to the Honorary Secretary,

Mr. L. Russell Marsh
19, Harcourt House,
19, Cavendish Square,
London, W. 1.

or to the Honorary Treasurer,

Dr. O. Henry
11B, Portland Place,
London, W.1.

Notes of Interest

Dayton G. Blume, D.D.S., M.S.D., announces the opening of his office at the Tower Building, 116 West 47th Street, Country Club Plaza, Kansas City, Missouri, practice limited to orthodontics, telephone, Logan 3155.

Russell K. Ephland, D.D.S., M.S.D., wishes to announce the opening of his office at 3 South Prospect Avenue, Park Ridge, Illinois, practice limited to orthodontics.

Dr. Ernest T. Klein announces the opening of offices at 523 Republic Building, Denver 2, Colorado, practice limited to orthodontics.

Dr. Herbert I. Margolis wishes to announce the association of Dr. Norman M. Cetlin, practice limited to orthodontics.

Dr. Mark H. Perrin of Topeka, Kansas, announces retirement from the active practice of orthodontics and will be succeeded by Dr. Lee R. McComb, 612 Mills Building, Topeka, Kansas.

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The AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY is composed of a representative of each one of the component societies of the American Association of Orthodontists.

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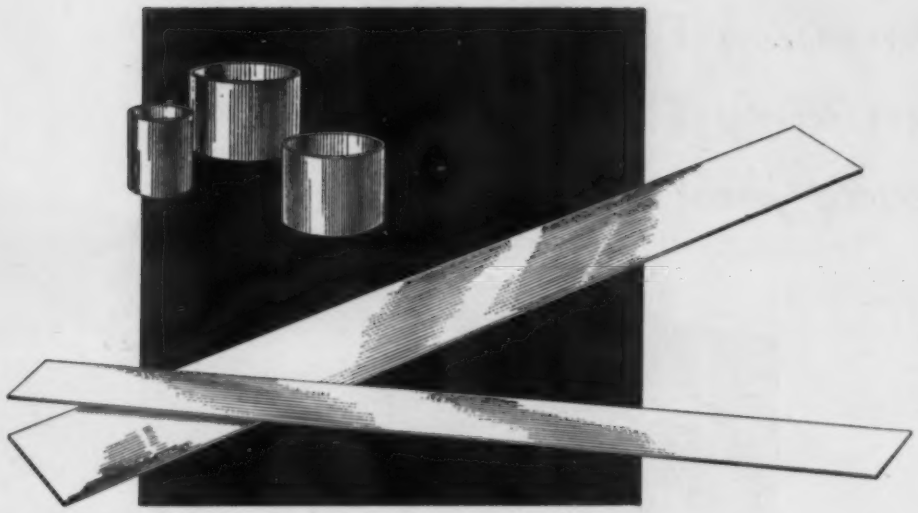

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